Health inequalities among Slovak adolescents over time

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Thesis for the University of Groningen, the Netherlands – with summary in Dutch and Slovak

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Chapter 1

Introduction

The body of research in the field of inequalities in health has been growing steadily, but the social processes which drive life course trajectories and contribute to sustained health disadvantages (Adler and Stewart 2010) remain of particular scientific interest. Research has thus far focussed mainly on deprivation in early life (Levin et al. 2011) and adulthood (Cohen et al. 2010). However, further important milestones in a person's biography, such as timing and circumstances of starting a family or entering the labour market, might also be important. Studying these critical life events may provide a deeper understanding of the origins of ill health from early to adult life (Graham 2007). In this context, studying adolescents' health can help us to understand the origin/etiology of socioeconomic health inequalities. Adolescence and young adulthood are critical periods for exposures that have long-term implications for the health and well-being of each individual. It is the time when young people establish health behaviours, life styles and value systems, which have important effects on their health in later life. Related to this, adolescence may be the most important period to intervene and invest in establishing healthy patterns (Call et al. 2002).

1.1 Health inequalities

Although eliminating socioeconomic health inequalities is a frequently voiced aspiration, there is little consensus on its definition (Braveman 2006). The term "Health inequalities" frequently refers to disparities in (access to) health care. It is also used in the United States to refer to differences in health care or health status among different racial and ethnic groups, whereas in Europe it more frequently refers to differences associated with social class and socioeconomic position (SEP) (Adler and Stewart 2010). In this thesis "health inequalities" will be used to denote socioeconomic health differences. Despite their differences, most definitions share a common element of identifying an inequality as a difference in health status between social groups (e.g., socioeconomic, racial/ethnic, gender) that is not only unnecessary and avoidable, but in addition, is considered unfair and unjust (Whitehead 1992).

1.1.1 Health inequalities in adolescence

The size of socioeconomic inequalities seems to be age specific. While social gradients in health are well-established for both children (DiLiberti 2000; Levin et al. 2011; Raat et al. 2011) and adults (Mackenbach et al. 1997; Majer et al. 2011; Stirbu et al. 2011), the evidence regarding adolescent health is much less consistent. Although some studies have reported significant inequalities in adolescent health (Geckova et al. 2004; Torsheim et al. 2004; Piko and Fitzpatrick 2007), several other studies have concluded that adolescence is characterised more by the absence than the presence

of class gradients in health (Tuinstra et al. 1998; Chen et al. 2002; West and Sweeting 2004). The inconsistent evidence has led some researchers to argue that adolescence may be a period in the life cycle that is characterised by "social equalization in health" (West 1997).

1.1.2 Health inequalities in Central Europe

From the early 1980s, socioeconomic inequalities in health have been studied in increasingly more European countries, including, with some delay, countries in Central Europe (CE) (Kunst 2009). By now, there is sufficient evidence to conclude that health inequalities persist across Europe, and that for some health outcomes, like general mortality, inequalities are particularly large in CE (Eikemo et al. 2008; Mackenbach et al. 2008; Leinsalu et al. 2009).

In particular, in absolute terms health inequalities are much larger in CE countries as compared with western European countries (Mackenbach et al. 2008). These larger inequalities are likely to be related to the communist past and the rapid social transitions since the early 1990's (Leinsalu et al. 2009). This recent history resulted in less developed welfare states, lower levels of social integration and higher levels of poverty (Kunst 2009). As psychological well-being was found to be related to both education level and household income, one might hypothesise that in CE more than in Western Europe current living conditions and the experience of financial strain may affect people's psychological well being in particular (Pikhartova et al. 2009; Skodova et al. 2009). At the level of specific risk factors, greater inequalities have been suggested with regards to factors such as alcohol abuse or vegetable consumption (Mackenbach et al. 2008; Prattala et al. 2009).

Still, the documentation of health inequalities in CE countries is fragmentary, and the understanding of their determinants and their pathways is still poor. Further research is needed to document the magnitude of the problems in populations not yet covered by previous studies, to determine the contribution of specific causes at the individual and national levels and to indicate opportunities for effective interventions (Kunst 2009).

1.1.3 Health inequalities in Central Europe among adolescents

Whereas there is a tradition of research on socioeconomic health inequalities in Western Europe, such information on Central European adolescents is lacking. Some researchers have paid attention to the effect of SEP on individual health in these countries, but very little has been published in international peer-reviewed journals. In the next section we briefly introduce some of the research in CE countries focussed on inequalities in health among adolescents.

One of the first studies in this field in a CE setting was that of Geckova et al. (2001; 2002; 2004). Inspired by the Scotland Twenty-07 Study (Sweeting and West 1994), their aim was to investigate the reasons for inequalities in health by socioeconomic circumstances, gender, the place people live, age, ethnic group and family type. The study had comparable indicators as well as a similar study sample as the Scotland Twenty-07 Study and aimed to compare the results of that study with data from Slovakia. In contrast to the results from many Western European

countries where no socioeconomic health and health risk behaviour inequalities among adolescents were found, Geckova et al. (2002; 2004) reported the existence/occurrence of such inequalities in Slovak 15-year-olds.

A study by Richter et al. (2009) provides directly comparable estimates of health inequalities among adolescents in CE countries and in other European countries. In this study data from the HBSC survey were used to estimate socioeconomic inequalities in the health behaviour of 13–15 year-old boys and girls for a wide range of countries. Family affluence and high parental occupation were consistently associated with higher vegetable consumption and less television viewing. Less consistent associations were observed for tobacco smoking and alcohol use, two behaviours on which peer influence and teenage cultures may have greater influence than family background (Bobakova et al. 2012). This pattern of inequalities was found in CE countries as well as in other parts of Europe. The only consistent east-west difference was that a low parental occupation was associated with lower vegetable consumption in all regions except CE. It is not clear whether this is due to differences between countries with regard to nutritional policies and dietary cultures, or in regard to other factors associated with occupational class, such as parents' behaviour (Prattala et al. 2009).

In another direct comparison, Sleskova et al. (2006) studied the effect of parental employment status on adolescents' health with regard to the context in which it occurred. A direct comparison of Slovak and Dutch adolescents showed that parental employment status influenced the health of adolescents differently in these two countries. Father's unemployment negatively influenced several aspects of Slovak males' health but had no effect on the health of Dutch adolescents. The worse financial situation of unemployed Slovak fathers might explain this finding. With regard to mother's employment status, having a mother who was disabled, unemployed or a housewife had a negative effect on the self-esteem of Slovak male adolescents. Among Dutch adolescents, having a mother who was a housewife was favourable for female adolescents' psychological well-being but was harmful for male adolescents' long-term well-being.

Despite such variations, the analyses of Richter et al. (2009), as mentioned above, illustrated that CE countries and other European countries may have more similarities than dissimilarities. Likewise, a recent study found a large degree of similarity with regards to the magnitude and pattern of health inequalities according to occupational class (Eikemo et al. 2008).

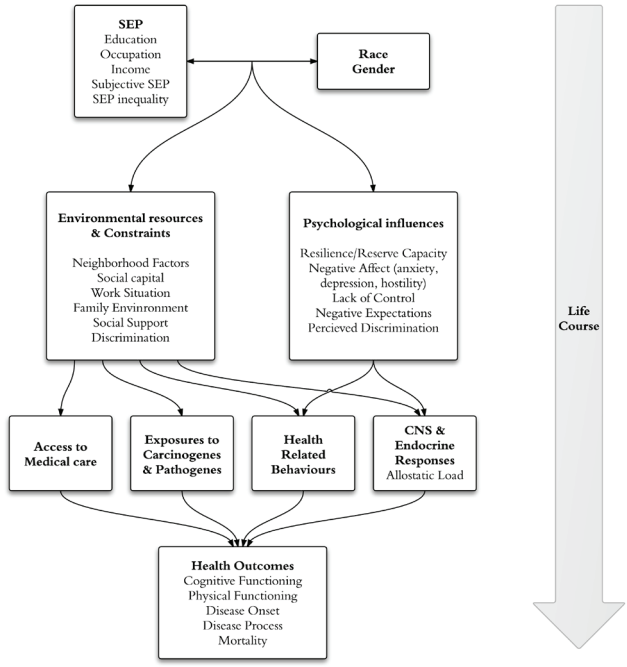
1.2 What are the links between childhood SEP and health in adulthood?

Several models have been developed to describe the major pathways by which SEP could influence health. Most of the findings presented in this thesis could be framed in a model that links environmental resources and psychosocial influences to adult health as presented by Adler et al. (2010)(see Figure 1.1).

Children from higher SEP families benefit from a better quality of environmental resources and constraints; e.g. higher SEP families are more likely to be able to afford homes with sufficient space, therefore reducing the likelihood of residential crowding (Myers et al. 1996). Schools visited by children from higher income families similarly have better physical facilities (Rouse and Barrow 2006). The social environment of

the surrounding neighbourhood also varies by socioeconomic factors. As the average SEP of a neighbourhood increases, levels of social capital increase, and threats of crime and violence decrease (Kawachi et al. 1997). Similarly, children attending schools located in more affluent neighbourhoods compared with children attending lower SEP schools are less likely to observe or be victimised by enacted or threatened physical violence (Khoury-Kassabri et al. 2004).

Figure 1.1 Pathways linking SEP and health (Adler and Stewart 2010).



SEP can substantially affect family functioning through family psychological influences. With increasing SEP, the likelihood increases that families have low levels of conflict, high levels of warm and attentive family relationships and of consistent parenting practices (Conger et al. 1992). Experiences in early life that shape interpretations of social stimuli may serve as a mechanism by which SEP affects health. Lower SEP environments pose more threats and foster more interpersonal conflict. Repeated exposures to such conflictual conditions may create expectancies that establish a lower threshold for perceiving a threat. Expectations of a threat may increase the likelihood of a negative affect and physiological stress responses. Chen et al. (2004) found that high school students from low SEP families did not differ from

their high SEP peers in interpreting clearly negative stimuli but were more likely to interpret an ambiguous situation as threatening. Cold and neglectful relationships with high levels of conflict, and harsh and inconsistent parenting are characteristics of "risky families" (Repetti et al. 2002; Taylor et al. 2006). Behaviours and affective states associated with risky families, in addition to being associated with low SEP, may also promote further socioeconomic disadvantage (Troxel and Matthews 2004).

Another important factor playing a role in the SEP health relationship could be the access to adequate health care. Insufficient care during childhood and adolescence could place individuals at greater risk for poor health throughout their life course (Cohen et al. 2010). This does not only concern affordability, i.e. the ability to pay, but also other means of accessing health care (i.e. having transportation or being sufficiently literate, etc.). Despite this explanation, childhood SEP predicts adult health outcomes even in countries where all children probably receive comparable access to medical care, irrespective of their socioeconomic circumstances (Cohen et al. 2004; Hemmingsson and Lundberg 2005; Metcalfe et al. 2005; Power et al. 2005; Khang 2006; Lawlor et al. 2006; Strand and Kunst 2006; Ramsay et al. 2007).

Higher SEP families are more likely to be able to afford residential space that is lacking potentially harmful exposures to carcinogens and pathogens such as lead-based paint, carbon monoxide or generally poor maintenance (Evans and Kantrowitz 2002; Evans 2006). The likelihood of children being exposed to environmental tobacco smoke within their homes increases with decreasing SEP as well (Mannino 2001; Barbeau et al. 2004). At the neighbourhood level, areas with a higher SEP are less likely to be located near sources of hazardous wastes and more likely to be characterised by clean air and water and to have adequately maintained public spaces (Evans 2006; Zhu and Lee 2008).

Health behaviours contribute to higher morbidity related to a range of diseases as well as to mortality (Cohen et al. 2010). Virtually every health behaviour, including smoking, physical inactivity, and unhealthy diets, is patterned by SEP. Low SEP adults are more likely to engage in risky health behaviours (Tuinstra et al. 1998; Umberson et al. 2010; Sebena et al. 2011). Findings among adolescents are less consistent. Previous research has shown a very strong traditional (consistent with adult behaviours) socioeconomic gradient regarding insufficient physical activity among adolescents (Currie et al. 2008; Richter et al. 2009). Also regarding smoking by adolescents, mostly traditional socioeconomic gradients were found (Adler and Stewart 2010), though a few studies have reported no such gradient (Donato et al. 1995; Tuinstra et al. 1998) or a reversed socioeconomic gradient (Huurre et al. 2003). On the other hand, no consistent socioeconomic differences in alcohol consumption have been found among adolescents. The relationship between SEP and alcohol consumption is usually weak or reversed (compared with adult socioeconomic gradients) (Elgar et al. 2005; Umberson et al. 2010). While binge drinking is associated with lower socioeconomic groups, some studies report that regular but moderate drinking is more common in higher socioeconomic groups (Romelsjo and Lundberg 1996; Elgar et al. 2005). Similarly in marijuana use among adolescents: mostly no gradient (Tuinstra et al. 1998; Piko and Fitzpatrick 2007; Pitel et al. 2011) or a reversed socioeconomic (Piko and Fitzpatrick 2007) gradient has been reported among adolescents.

Differential exposure to stress constitutes a further pathway between SEP and health. Lower SEP environments expose individuals to more stressors while simultaneously providing them with fewer resources to deal with these stressors. These environments increase the likelihood of acute stress exposure and also

contribute to “toxic” chronic stress (McEwen and Gianaros 2010). The chronicity and severity of stressors play key roles in moderating the nature and intensity of associated alterations in immunologic parameters (Segerstrom 2004) and inflammatory processes (Ranjit 2007; Miller 2008). In addition to the direct physiological effects of toxic stress that increase the risk of disease, individuals may attempt to cope with these experiences through health-endangering behaviours (Adler and Stewart 2010).

1.3 What are the mechanisms leading from childhood SEP exposure to adult health?

Three broad conceptual models hypothesise when and how the implications of SEP-related physical and psychosocial exposures during childhood and adolescence might be of interest in relation to adult health (Kawachi et al. 2002; Cohen et al. 2010). Firstly, the latent effects/timing model hypothesises that the early life environment affects adult health independent of intervening experience (Pollitt et al. 2005). According to this model, SEP-related factors have the greatest influence on adult health if experienced during specific developmental periods defined as age ranges (e.g., birth to three years) or more broadly as periods of development (e.g., childhood, adolescence).

Secondly, the pathway effects/change model hypothesises that the early life environment sets individuals onto life trajectories that in turn affect health status over time (Smith 1999). This model hypothesises that the direction of SEP mobility across childhood and adolescence has important implications for adult health outcomes. Predictions of this model include that upward mobility – a change from lower to higher levels of SEP – would result in better adult health.

Thirdly, the cumulative effects/accumulation model is based on the presumption that the intensity and duration of the exposure to unfavourable environments adversely affects health status according to a dose-response relation (Ben-Schlomo and Kuh 2002). The accumulation model suggests that the detrimental effects of low SEP accrue throughout the life course in such a way that the risk for poor adult health increases with an increasing intensity of the socioeconomic disadvantage and with an increasing duration of the exposure to such disadvantage. In contrast to the firstly mentioned timing model, this accumulation model is indifferent to when the SEP-related exposures occur during childhood and adolescence. Rather, the accumulation model considers risk in proportion to the total dosage of the exposure to SEP-related adversities over the course of childhood and adolescence (Hertzman 1999).

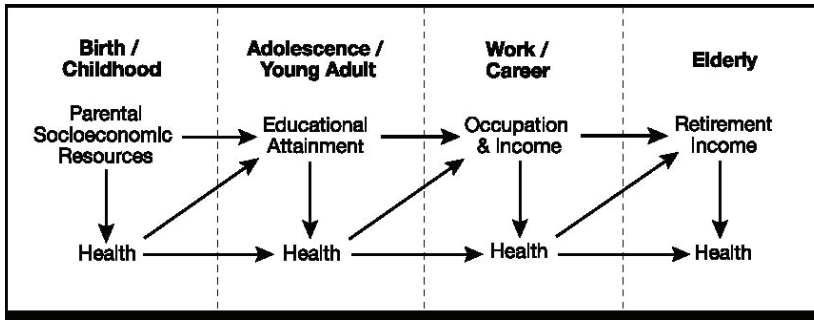
Regardless of the underlying mechanisms, life course effects are fundamental to an understanding of the origins of health inequality (Barker et al. 2001). To the extent that health inequalities in adult life are partly determined by early life circumstances, their elimination cannot be left to individual choice alone (Kawachi et al. 2002).

1.4 Reverse causality

Research establishing the gradient relationship between SEP and health is primarily cross-sectional, and because of the designs used a causal direction cannot be firmly

established (Kawachi et al. 2010). Most researchers interpret SEP as a determinant of health status (Flay and Petraitis 1994). However, health status could also affect SEP. The clearest demonstration of the effect of SEP on health is in relation to birth outcomes (Adler and Stewart 2010). Infants born to mothers with less education and less income are more likely to experience intrauterine growth restriction, be born prematurely, and have a low birth weight (Kramer et al. 2000). This disadvantage sets them on trajectories of poorer health, but also of lower adult SEP achievement (Smith 1999), as childhood illness affects academic achievement that, in turn, shapes adult SEP (Case et al. 2005). As shown in Figure 1.2, there are reciprocal influences, with SEP impacting health and health impacting success in various SEP domains (e.g., educational attainment, adult occupation and income, retirement assets)(Adler and Stewart 2010).

Figure 1.2 The dynamic and reciprocal relationships between SEP and health through the life course (Adler and Stewart 2010).



1.5 Stability of SEP patterns in health over time

Historical time and the impact of historical contexts (period effects *) could also affect changes of SEP patterns in health (Mayer 2009). Adverse circumstances experienced by low SEP in childhood and adolescence may be very different in one generation vs. another and therefore will not have similar health effects (Galobardes 2004). There have been a number of contributions which compared birth cohorts and showed period effects, i.e., in regard to transitions to adulthood (Brückner and Mayer 2005; Fussell and Furstenberg 2005; Gauthier and Furstenberg 2005), income trajectories (Brückner 2004) or regards to educational opportunities (Hillmert and Mayer 2004).

In the early 1990s Central European countries went through a turbulent period of political, economic and health care reforms. Childhood and adolescence adversity during the political regime change during the 1990s may be associated with different health consequences than adversity experienced by the current generation of children and adolescents exposed to low SEP environments. Diewald et al. (2006)

* In order to study phenomena that are time-specific, models using Age, Period, and Cohort (APC) as explanatory variables were developed (Yang and Land 2006). Age effects represent the variation associated with different age groups brought about by physiological changes, accumulation of social experience, and/or role or status changes. Period effects represent variation over time periods that affect all age groups simultaneously—often resulting from shifts in social, cultural, economic, or physical environments. Cohort effects are associated with changes across groups of individuals who experience an initial event such as birth or marriage in the same year or years; these may reflect the effects of having different formative experiences for successive age groups in successive time periods (Glenn 2003).

have traced the consequences of the transformation of Eastern Germany on the individual life course. They showed that former qualifications, skills, gender, and age at the time of the transformation were the strongest predictors of individuals life trajectories after the system rupture. Silbereisen et al. (2002) compared Western Germany and Poland regarding the effects of family income loss on depressive mood and transgression among adolescents. The study showed that, in contrast to Western Germany, in Poland a decline of family income did not result in a higher depressive mood of fathers and, consequently, of children. Comparison of two cohorts of young Slovak adolescents performed by Pitel et al. (2011) showed a shift in health-related behaviour patterns between cohorts from 1998 and 2006, e.g. manifested in diminished gender differences in adolescent health-related behaviour.

1.6 Aims of the study and research questions

The present study intends to make a contribution to the relatively neglected field of socioeconomic inequalities in adolescence by studying this particular relationship. Based on the above-mentioned information, socioeconomic inequalities in adolescence will be analysed from several points of view. Firstly, we will look at changes in health status, assessed using subjective health indicators in a cohort of 15-year-old adolescents who were followed-up to the age of 19. Secondly, the socioeconomic differences in changes of self-reported health in the same cohort will be analysed. Thirdly, the period effect on patterns of self-rated health is assessed by comparing cohorts of Slovak adolescents from 1998 and 2006. Next, since health-related behaviours contribute to higher morbidity related to a range of diseases as well as to mortality, we explore how changes in health-related behaviours contribute in a cohort of 15-year-old adolescents followed-up to the age of 19. Adolescents' smoking, alcohol use, experience with marijuana and lack of physical exercise with regard to SEP are all assessed. Finally, we assess whether social support from mother, father and friends mediates or moderates socioeconomic differences in self-rated health among adolescents. Social support from parents and peers is an important factor which can protect the health of young people in the context of their socioeconomic position. The model of the relationships examined within this thesis is shown in Figure 1.3.

Based on the theoretical background above, the following main research questions have been formulated:

Research question 1

Do changes over time in self-reported health occur between ages 15 - 19 years? (Chapter 3)

Research question 2

Do socioeconomic differences occur in the change over time in health among adolescents between age 15 and 19 years? (Chapter 4)

Research question 3

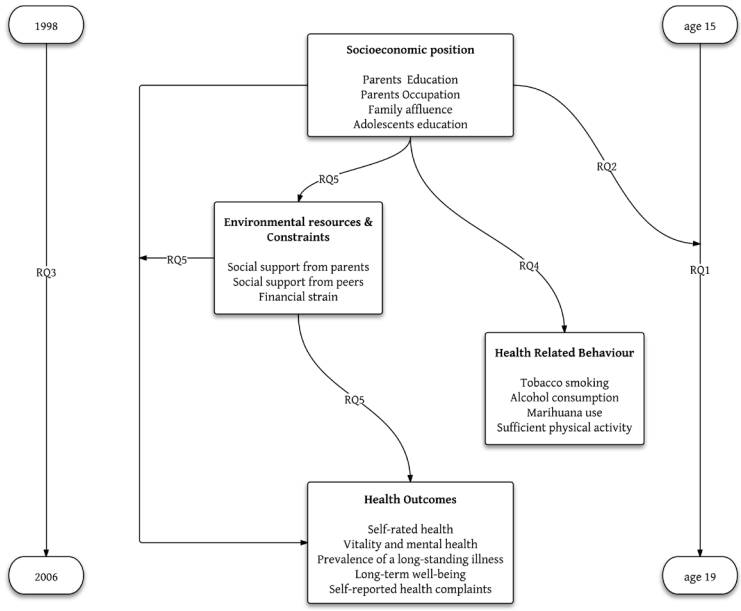
Are there differences in socioeconomic inequalities in self-rated health among Slovak adolescents between 1998 and in 2006? (Chapter 5)

Research question 4

Do socioeconomic inequalities occur in changes in health-related behaviour among Slovak adolescents between ages 15 and 19 years? (Chapter 6)

Research question 5
Does social support mediate or moderate socioeconomic differences in self-rated health among adolescents? (Chapter 7)

Figure 1.3 Model of the relationships between key constructs examined in the thesis



1.7 Structure of the thesis

This thesis is divided into eight chapters. ***Chapter 1*** provides general information about health and socioeconomic differences in health in the adolescence period. Changes of socioeconomic differences in health during adolescents and possible mechanisms causing these changes are also described. The main aim of the study and several research questions are stated in this chapter.

Chapter 2 presents information about the research samples used in this thesis. Further, it gives a brief description of the measures and statistical analyses used.

Chapter 3 describes the health status of young people in Slovakia using self-reported health indicators. It presents the results of a longitudinal study which contributed to the clarification of the direction and magnitude of changes of the health status in a cohort of 15-year-old adolescents who were followed-up to the age of 19.

Chapter 4 deals with socioeconomic differences in changes of self-reported health in a cohort of 15-year-old adolescents who were followed-up to the age of 19. It assesses whether changes of self-reported health differed according to educational level of respondents, current occupational status of respondents, educational level and occupational status of parents.

Chapter 5 describes the differences in socioeconomic inequalities in self-rated health among cohorts of Slovak adolescents in 1998 and in 2006. It presents prevalence rates for reporting poor health according to the educational level of the respondents, current occupational status of respondents, educational level and occupational status of parents. Secondly, the magnitudes of socioeconomic differences in health are measured by indexes of dissimilarity.

Chapter 6 deals with health-related behaviour in a cohort of adolescents between age 15 and 19. It explores changes of in adolescents' smoking, alcohol use, experience with marijuana and lack of physical exercise with regard to their current education level and employment status and the highest education level and highest occupational status of their parents.

Chapter 7 deals with social support and its role in socioeconomic differences in self-rated health among adolescents. It assesses whether social support from mother, father and friend mediates or moderates socioeconomic differences in self-rated health among Slovak adolescents.

Chapter 8 contains a discussion of the main findings of the previous chapters in a general context. In addition, implications for future research as well as for practice are suggested.

Chapter 2

Study design

This section presents an overall picture of the study context and of the data sources, measures and statistical analysis used within this thesis.

2.1 Study context

In the early 1990's public health experts from the University of Groningen took the challenge of doing research in Central Europe and started collaboration with several Central European universities. In order to create a framework for several mutual research projects, in 1995 the Central European Network was established. From 2000 on the University of Groningen focussed on collaboration with Safarik University in Kosice. Eventually, an informal multidisciplinary group with strong support from University of Groningen transformed into a formal academic unit: the "Kosice Institute for Society and Health (KISH)".

KISH launched several research projects and started building up an expert network and educational program for young researchers. In the 1990s it focussed exclusively on health surveys among adolescents and among the chronically diseased. At present, these two fields are still the main research programmes, referred to as 'Youth and Health' and 'Chronic Disease', but now its research domain is wider, covering nearly the entire life span, using cross-sectional as well as longitudinal health surveys, mortality data and data already collected from samples of ethnic minorities.

This particular study presents a part of the longitudinal research concerning socioeconomic inequalities in the health of adolescents. Inspired by the Scotland Twenty-07 Study (Sweeting and West 1994), a study of socioeconomic health and health risk behaviour inequalities among Dutch adolescents (Tuinstra et al. 1998) was started in Groingen (The Netherlands) in 1993. With the aim of comparing the results of this Dutch study with data from Slovakia, as one of the Central European countries, a similar study with comparable indicators and a similar study sample was performed in Slovakia in 1997 (Geckova et al. 2004). In contrast to the results from many Western European countries where no socioeconomic health and health-risk behaviour inequalities among adolescents were found (Tuinstra et al. 1998; Chen et al. 2002; West and Sweeting 2004), Geckova et al. (2004) reported the presence of such inequalities in Slovak 15-year-olds. Because this was the first study on inequalities in Slovakia and many questions remained open, new research had to be done. For this purpose new cross-sectional data collections among adolescents were carried out in 2002 and 2006. In addition, a second wave of data collection in Geckova's cohort was carried out in 2002. Data from 19-year-old secondary school-leavers were obtained. Using these data the present study focuses on socioeconomic differences in health and among Slovak youth.

2.2 Data sources

This study uses several samples. A brief description of these samples and information about their use in the separate chapters of this thesis is provided in Table 2.1 In the following text, samples are described in chronological order based on the year of data collection. However, samples 1 and 3 were most often used for the analyses within this thesis.

Sample 1 consists of the respondents from the first wave of the longitudinal study "Socioeconomic inequalities in health" conducted by Geckova et al. (2004). These data are presented in Chapters 3, 4, 5 and 6. Data were collected in September and October 1998. Students in the 1st year at 31 secondary schools in Kosice participated in this study. The sample consisted of 2,616 Slovak adolescents (52% males). A response rate of 96.3% was achieved. The sample of respondents was stratified by type of school, and the proportions of the regular Slovak school system were maintained. The respondents completed the questionnaire in their classrooms under the guidance of a researcher. Respondents were age13.8 to 17.3 years and their mean age was 14.9 years.

Sample 2 is used in Chapter 7. It was comprised of data from the broad data collection which was carried out among secondary school students from the Kosice region in Slovakia in the winter of 2002/2003. The schools and classes in schools were chosen randomly, stratified by the five educational levels of the regular Slovak school system. The sample consisted of students from the 1st years of 24 secondary schools. Respondents completed a questionnaire at school on a voluntary and anonymous basis in the absence of their teachers and in the presence of the researcher. In total 1,992 questionnaires were collected, 46.6% of them from males. A response rate of 98.9% was achieved. Non-response was mainly due to absence from school. Mean age of the respondents was 16.9 years.

Sample 3 is used in Chapters 3, 4 and 6. It consists of the respondents who agreed at baseline in 1998 to participate in the second wave of the longitudinal study "Socioeconomic inequalities in health". Those respondents who agreed to participate in the second wave (N=1850) received a questionnaire by mail in December 2002 together with a stamped return envelope. One reminder – the same questionnaire with a stamped return envelope – was sent to those who did not reply. In total, we received 844 usable questionnaires, representing a response rate of 45.5%. To compare respondents and non-respondents several analyses were performed. Girls were over-represented in the response group (57.3%) compared with the nonresponse group (46.5%; $p<0.01$). In the response group more grammar school students (29.3% versus 19.2%) and fewer apprentice students (25.5% versus 39.1%) took part in the second wave of the study. With regard to their health status, students who participated at the age of 19 had statistically significantly worse mental health and vitality at the age of 15 and a higher number of physical complaints. However, these differences were trivial in size according to Cohen's thresholds (0.13, 0.18 and 0.14, respectively).

Data for Sample 4 were collected at the end of 2006 at 46 elementary schools in major Slovak cities representing different parts of the country: Bratislava (Western Slovakia), Žilina (Northern Slovakia), Košice (Eastern Slovakia) and other smaller cities in the eastern region of Slovakia. Research assistants administered questionnaires during two regular 45-minute lessons in a 90-minute period of time. Students filled out the questionnaires on a voluntary and anonymous basis in the absence of teachers. In total data from 3,694 students ranging from age 13 to 16 (mean age 14.3 years;

49% males) were collected with an overall response rate of 93.5%. Sample 4 was used in Chapter 5, where it was compared with Sample 1. As Sample 1 consisted of data only from the Kosice region, in this thesis only the subsample from the Kosice region, which consisted of 1,821 respondents (mean age 14.4 years; 49% males), was used.

In Table 1 the basic characteristics of Samples 1-4 are presented.

Table 1 Basic characteristics of the research samples

		Sample 1	Sample 2	Sample 3	Sample 4
Chapter(s)		3,4,5,6	7	3,4,6	5
Sample size		2616	1992	844	1821
Data collection	year	1998	2002	2002/2003	2006
Gender	male	52.0%	46.6%	42.7%	49%
	female	48.0%	53.4%	57.3%	51%
Age	mean	14.9	16.9	19.6	14.4
	SD	0.62	1.1	0.60	0.64
Response rate		96.3%	98.9%	45.5%	93.5%

2. 3 Measures

This section presents an overall picture of the variables used within this thesis. The central dependent variables are the indicators of the respondents' subjective health status (Chapters 3, 4, 5 and 7). The concept of health is very broad, and a wide range of different definitions exists. In this study we do not pay attention to all aspects of health, but we tried to include some of them, including physical and mental health and well-being. Indicators of general health (self-rated health), physical health (long-standing illness, VOEG health complaints) and psychological well-being (SF-36 vitality, SF-36 mental health, GHQ-12, long-term well-being) were used to assess young people's health status. In Chapter 6 indicators of health-related behaviours (tobacco smoking, alcohol consumption, experience with marijuana and lack of physical exercise) were used as dependent variables.

The independent variables used in this study include the indicators of socioeconomic position of respondents (such as a respondent's education, parents' education, parents' occupation, financial strain, family affluence scale) and indicators of parents' social support. A brief outline of these dependent and independent variables is presented in Table 2 Information about the origin of the measurement and a short description of the measurement are provided.

2.4 Statistical analysis

Several statistical methods were used across this study to analyse data. All analyses were performed using the statistical software package SPSS, versions 12.0, 14.0 and 16.0. Standard descriptive analyses regarding the studied variables were performed in Chapters 3-7. In Chapter 3, changes over time between the ages of 15 and 19 years

Table 2 Brief summary of determinants and instruments used in this thesis

Name of the instrument (question)	Source	Chapter	Short description
Health			
Self-rated health	SF-36 (Ware and Sherbourne 1992)	3,4,5	Widely used question assessing general health
Vitality		3	Questions focussing on energy and fatigue
Mental health	SF-36 (Ware and Sherbourne 1992)	3	Questions focussing on psychological distress and well-being
Long-standing illness s/ serious illness		3	Widely used for measuring the occurrence of long-standing illness
Self-Perceived Health complaints	SF-36 (Ware and Sherbourne 1992)	3	Health complaints experienced during the previous month
Long-term well-being		3	Stylised faces to express the feelings about life in the past year
Social support	Derived from Glendinning et al. (1992)		
Social support		7	Measuring the parental and peer social support
Socioeconomic position	VOEG (Jansen and Sikkel 1981)		
Respondent's education		4,6,7	Type of secondary school visited by respondents
Respondent's occupational status	McDowell & Newell (1996)	4,6	Occupational status of respondents after leaving school
Parents' education		4,5,6,7	Highest education level of parents
Parents' occupation		4,6	Current occupational status of parents
Financial strain	Derived from Turner and Marino (1994)	7	Measure of inability to do certain activities due to lack of money
Family affluence scale		7	Indicator of consumption and material deprivation of the family
Health-related behaviour			
Smoking	Derived from Currie et al. (1997)	6	Experience with tobacco smoking
Alcohol use		6	Experience with alcohol during last week
Experience with marijuana	Derived from Currie et al. (1997)	6	Lifetime experience with marijuana
Lack of physical exercise		6	Weekly physical activity

were analysed with Wilcoxon matched-pairs signed ranks test for continuous variables and McNemar test for dichotomised data. We calculated 95% confidence intervals (95% CI) for the differences in proportions. Discrete variables were compared using the $\chi 2$. In Chapters 4 and 6, changes in health and health-related behaviours between the ages of 15 and 19 by socioeconomic position (SEP) cat-egory were analysed using the nonparametric McNemar test for two related dichotomous variables. Changes in health and health-related behaviours gradients with regard to SEP were analysed using logistic regression. In Chapter 5, socioeconomic differences in health were analysed using logistic regression. In Chapter 7 socioeconomic differences in social support were analysed using ANOVA. To test for possible mediating and/or moderating effects of social support, binary logistic regression models were performed. Further details of the analyses can be found in the "Statistical analyses" sections of the separate chapters.

Chapter 3

Deterioration Is Not the Only Prospect for Adolescents' Health: Improvement in Self-reported Health Status Among Boys and Girls From Age 15 to Age 19*

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Abstract

Aim.

To assess changes in the mental and physical health of adolescents between the ages of 15 and 19.

Methods.

The study included a four-year follow-up of 844 students from 31 secondary schools located in Košice, Slovakia (response rate 45.6%). The 36-item short form (SF-36) scales were used to assess vitality and mental health, self-rated health, long-term well-being, long-standing illness, and the number of perceived health complaints at the age of 15 and four years later.

Results.

Both boys and girls reported significant deterioration in vitality (mean difference boys 5.3; girls 3.3; P= 0.001) and mental health (mean difference boys 7.7; girls 5.7; P= 0.001), while only boys reported deterioration in self-rated health (P= 0.047). The proportion of boys who reported an improvement ranged from 8%-40%, while the proportion of girls who reported an improvement ranged from 8%45%. Significantly more girls than boys reported an improvement in mental health (27% of boys vs 34% of girls) and vitality (32% of boys vs 39% of girls), while more boys than girls reported a deterioration in vitality (55% of boys vs 48% of girls). These differences were trivial according to the effect size (Cohen's H<0.20).

Conclusion.

Although significant deterioration in mental health and vitality was detected among both genders, with boys deteriorating more substantially in self-rated health than girls, the differences between the proportion of those with improved and those with deteriorated status were trivial in size.

Introduction

It is of interest to study change in health during the period of adolescence because it has a psychological and physical impact on adolescents' further development. In general, health status of subjects during this period is assumed to deteriorate (Currie et al. 2000; Hidalgo et al. 2000; Hidalgo et al. 2000; Sleskova et al. 2005). Several studies have shown that girls reported worse health than boys (Settertobulte and Kolip 1997; Wyke et al. 1998; Lahelma et al. 1999; Schraedley et al. 1999). These gender differences remain stable over time, as was shown in a longitudinal study of Finnish adults (Lahelma et al. 1999).

The fact that physical and psychological health deteriorates in the period preceding adulthood is shown in many studies (King et al. 1996; Currie et al. 2000; Wade et al. 2000; Currie et al. 2004; Wight et al. 2004). Most of these results were found by cross-sectional studies. Both in the cross-sectional study by Wade et al. (2000) among Americans and Canadians aged from 11 to 21 years, and the longitudinal study by Mechanic (1987) among Americans aged 12 to 17, no change in self-reported health was found. A cross-sectional study by Waters et al. (1999) on Australians aged from 11 to 18 found different effects of age on self-reported health. However, the cross-sectional studies by Hidalgo (2000) on the Spanish respondents aged from 14 to 20 and by Simeoni (2001) on French adolescents aged 11 to 17 reported worsening of psychological well-being. Furthermore, Currie et al. (2004) reported worsening of self-reported health with advancing age in a study that investigated the health status of children and adolescents aged 11, 13, and 15 years in 35 countries and regions of the United States and Europe. Wade et al. (2002) in a longitudinal study reported a substantial worsening of self-reported health and depressive symptoms in children from age 11 to age 15, followed by a plateau (stable period) from age 15 to age 19 and an improvement in health after the 19th year. However, in contrast with these outcomes, the results of Hankin et al. (1998) on clinical depression showed a plateau in children from age 11 to age 15, worsening between age 15 and age 18 year, and again a plateau from age 18 to age 21. Furthermore, Wight et al (2004) found that the prevalence of depressive symptoms increased from the age 12 to 20, with a plateau between the age of 15 and 17. Thus, the results of both cross-sectional and longitudinal studies on changes in health status are consistent, since there was, on average, no improvement between the ages of 11 and 19. The results of these studies on perceived health status among adolescents suggest that health seems to be set to deteriorate or remain stable during certain phases. This may lead to a bias that distracts public health researchers and professionals from the hypothesis that in a given population it is also relevant to detect those who improved, even though the majority deteriorates or remains stable. Therefore, the current longitudinal study was performed to contribute to the clarification of the direction and magnitude of changes in health status in a cohort of 15-year-old adolescents who were followed-up to the age of 19.

Participants and methods

Participants

The sample was stratified according to the type of secondary school. After leaving elementary school (9 years of attendance), Slovak adolescents aged around 15 enter one of the following four types of secondary schools: 1) four-year general secondary school providing brode education and preparation for university study; 2) four-year specialized secondary school providing usually technical education, after which it is also possible to study at university; 3) four-year apprentice school providing education for manual occupations; 4) three or two-year apprentice school providing only basic education for manual occupations. A computer program generating random numbers was used to randomly select numbered schools per stratum. After inclusion, no school dropped out. The sample consisted of 1850 first grade students from 31 secondary schools (7 general secondary schools, 13 specialized schools, 11 apprentice schools 4 four-year, and 7 three-year apprentice schools) located in Košice, Slovakia. Based on official statistical data from the Institute of Information and Prognosis of Education, Bratislava, we ensured by means of quota sampling that the proportions of male and female students and their educational levels represented their proportions in Slovakia. Participants completed the baseline questionnaire in their classrooms, under the guidance of field workers. Four years later, respondents received a self-administered questionnaire by mail together with a stamped return envelope. A single reminder was sent to those who did not reply. We received 844 questionnaires that served the purpose of analysis, representing the response rate of 45.6%.

Outcome measures

According to Hammarström and Janlert (1997), the most common way of examining health problems among young people is through self-reported symptoms. Six subjective health in-dicators assessing the health status of respondents were used in this study.

Self-rated health is widely used in health studies because it is generally accepted as a good predictor of mortality and morbidity (Sadava et al. 2000). Respondents assessed their health us-ing the five-point Likert scale from “excellent” to “bad.” For this analysis, excellent and very good health ratings were considered as one group; while good, fairly good, and bad ratings were, according to the findings of Geckova et al. (2001), considered as a second group.

Vitality and mental health are two scales in the 36-item RAND questionnaire (Ware and Sherbourne 1992). The vitality scale consists of four items focusing on energy and fatigue. Mental health scale is a five-item scale focusing on psychological distress and well-being. For both indicators, respondents were asked to evaluate their feelings during the previous four weeks using five-point Likert scales. Sum scores were then transformed into scales with a possible range from 0 (worst) to 100 (best).

Prevalence of a long-standing illness was assessed by the following question: “Do you have any long-standing illness (lasting for more than three months)?” with the response options “yes” and “no” (Glendinning et al. 1992).

Long-term well-being was measured on a seven-point scale consisting of stylized faces, with “1” representing the highest degree of well-being and “7” the

lowest. Respondents rated their feelings about their life over the past year. The scale was used to assess socio-emotional health, in addition to global and physical health measured by other indicators. This simple scale provides a better representation of respondent's feelings than similar verbal scales, with a sufficient test-retest reliability and a median validity coefficient of 0.82 (Andrews 1996).

Information on self-reported health complaints was collected by the Netherlands Health Interview Survey (VOEG) (Jansen and Sikkel 1981; Hartgers et al. 1992; Martens et al. 1999). It comprises thirteen dichotomous questions on complaints related to general fatigue, the stomach, musculoskeletal system, and cardiovascular system. Internal scale reliability proved to be good (Cronbach's α = 0.86) and test-retest reliability was satisfactory (Pearson r = 0.76) (van der Velden et al. 1998). Possible scores on the VOEG scale ranged from 0 to 13, with a higher score indicating more health complaints.

Estimation of longitudinal changes

Outcomes of statistical testing for average difference scores between independent samples or paired observations may result in a mean difference score, indicating deterioration due to the fact that a majority of these difference scores indicate deterioration after subtraction of two mean scores. However, this does not mean that positive (improvement) or zero scores (remaining stable) do not exist in the distribution. Using the respondents as their own "controls" allows for comparisons between those who improve, remain stable, or deteriorate in health. Detection of those who reported an improvement, remained stable, or reported deterioration was performed in two steps. In the first step, we differentiated a change found by sample fluctuation from a significant change in perceived health between the ages of 15 and 19 and estimated the magnitude of the difference with Cohen's effect size "d" (Cohen 1988) for continuous scales when the change was significant. For individualized effect size calculation, we used the pooled standard deviation as the standardizing unit of mean difference score over time, so as to avoid overestimation of effects (Middel and van Sonderen 2002). According to the thresholds of Cohen, health status was classified as deteriorated with an effect size $\leq$-0.20, as stable with an effect size between -0.19 and +0.19, and as improved with an effect size $\geq$+0.20, only in cases when the mean difference was not due to random error ($P<0.05$). For $\chi 2$ differences Cohen's effect size "w" was used (Cohen 1988). Thresholds of effect size "w" for appraisal of "small," "medium," and "large" differences between proportions were 0.10, 0.30, and 0.50, respectively. In the second step, we used the individualized effect size to detect proportions of those who reported improvement (positive effect size), remained stable (trivial effect size), or reported deterioration (negative effect size), and tested the significance of differences in proportions (Newcombe and Altman 2000) and estimated the magnitude of the difference between proportions with Cohen's effect size "h" (1988). Thresholds of effect size "h" for appraisal of "small," "medium," and "large" differences between proportions were 0.20, 0.50, and 0.80, respectively. For effect size interpretation, Cohen (1988) used the term trivial, which we prefer to the term "insignificant," since the term "insignificant" carries the relationship to statistical significance.

Statistical analysis

Analyses were performed using the Statistical Package for the Social Sciences, version 16.0.1 (SPSS Inc. 2007) and for all tests P-values of <0.05 were considered significant. Differences between the means were not normally distributed (Shapiro Wilk, P<0.05) and, therefore, paired testing was done using a non-parametric test. Longitudinal change between the ages of 15 and 19 years was analyzed with Wilcoxon matched-pairs signed ranks test for continuous variables and McNemar test for dichotomized data. We calculated 95% confidence intervals (95% CI) for the differences in proportions (Newcombe and Altman 2000). Discrete variables were com-pared with the $\chi 2$ (Fisher exact test when appropriate).

Results

The sample consisted of 844 adolescents who participated in the study at the age of 15 and 19. At baseline, 1850 students participated and were invited to fill out the questionnaire at the age of 19. The response rate was 45.6%. At baseline boys and girls did not differ in the six health indicators used in this study (Table 1). Girls were over-represented in the responder group, in comparison with the non-response group (Table 1). More general secondary school students and fewer apprentice students participated in the second stage of the study. Students who participat-ed in the second stage of the study had at the age of 15 a significantly worse mental health, vitality, a higher number of physical complaints, a better long-term well-being, and a lower prevalence of long standing illness than those who did not participate in the second stage. However, according to Cohen's thresholds these significant differences were trivial in size (Table 1) (Cohen 1988).

Longitudinal changes in mental and physical health among boys and girls

Boys and girls reported a significant deterioration (P<0.05 for both) in vitality and mental health between the ages of 15 and 19. Among girls the longitudinal change in vitality was trivial in size (although significant), but the change in mental health in both genders exceeded the criterion of effect size ≥0.20. Boys and girls reported a significant deterioration in long-term well-being with moderate effect sizes. No significant differences between boys and girls aged from 15 to 19 were found in the number of self-reported physical complaints assessed with the VOEG and in the prevalence of a long-standing illness. Only in boys, self-rated health deteriorated signifi-cantly from excellent or very good at the age of 15 to good, fairly good, or bad at the age of 19. According to Cohen's thresholds for the effect size "w," this change was found to be small since it exceeded the criterion of effect size ≥0.10.

We showed that, on average, boys and girls experienced a deterioration in their self-per-ceived health, which confirms the general trend in measuring health in this important stage of life (Table 2). However, this average outcome does not imply that there are no subjects who improved in health or remained stable.

Although young adolescents deteriorated in 6 domains of health status (6-60% of boys; 6-56% of girls), but relevant proportions of boys and girls improved (8-40% of boys; 845% of girls) or remained stable (13-86% of boys; 10-86% of girls) between the age of 15 and 19 (Table 3).

Table 1. Characteristics of student responders and non-responders at baseline

Parameter	Non-responders (n=1006)	Responders (n=844)	P	Effect size
Sex*:				
female	468 (46.5)	483 (57.2)	0.001†	0.21‡
male	538 (53.5)	361 (42.8)		
Type of school*:				
general	193 (19.2)	247 (29.3)	6.2-14.0§	
specialized	420 (41.7)	382 (45.3)	-10.2-8.0§	
apprentice	393 (39.1)	215 (25.5)	-9.3-17.7§	
Short-Form-36 (SF-36) self-rated health*:			0.356†	0.09‡
excellent/very good	518 (61.4)	636 (63.5)		
good/fairly good/bad	325 (38.6)	637 (36.5)		
Long-standing illness >3 mo*:			0.043†	0.12‡
yes	83 (9.8)	72 (7.2)		
no	761 (90.2)	933 (92.8)		
SF-36 vitality‖	983 (0.63±0.17)	838 (0.60±0.17)	0.003¶	0.18 (0.08-0.27)**
SF-36 mental health‖	983 (0.69±0.16)	838 (0.67±0.16)	0.005¶	0.13 (0.03-0.22)**
Number of self-rated health complaints (VOEG)‖	1003 (2.12±2.44)	844 (2.47±2.39)	0.016¶	0.14 (0.05-0.24)**
Long-term well-being‖	983 (1.58±0.49)	838 (1.55±0.50)	0.027†	0.06 (0.03-0.15)**

**No. (%); †Fisher exact test; ‡Cohen's H; §95% confidence interval for difference of proportions; ‖No.; mean (standard deviation); ¶t test; **Cohen's d - pooled effect size (95% confidence interval for effect size); ††Mann-Whitney U-Wilcoxon-W test.*

Table 2 Change in mental and physical health status between boys and girls aged 15 and 19

Scale	Boys (n=359)				Girls (n=479)			
	15 y*	19 y*	P (Z)	Effect size	15 y*	19 y*	P (Z)	Effect size§
SF-36 vitality	63.8±16.6	58.5±17.1	0.001†	-0.32§	57.4±17.6	54.1±17.6	0.001†	-0.18
SF-36 mental health	71.2±14.8	63.5±15.8	0.001†	-0.52§	64.6±15.7	58.9±17.9	0.001†	-0.36
Long-term well-being	2.4±0.9	2.8±1.3	0.001†	0.54§	2.4±0.9	2.9±1.3	0.001†	0.71
Number of self-rated health complaints (VOEG)	2.0±2.2	1.8±2.3	0.532†		2.8±2.4	2.8±2.6	0.849†	
Long-standing illness >3 mo (%)	7.9	7.2	0.942‡		8.7	8.7	0.368†	
SF-36 self-rated health								
	Excellent/very good 19 y	Good/fairly good/bad 19 y			Excellent/very good 19 y	Good/fairly good/bad 19 y		
Excellent/very good at 15 y	181	68	0.047‡	0.1‖	192	76	0.218†	
Good/fairly good/bad at 15 y	46	64			93	120		

**Mean±standard deviation.*

†Wilcoxon matched pairs signed rank test.

‡McNemar test.

§Cohen's d.

‖Cohen's W

*Table 3 Proportions of boys and girls who reported improvement, remained stable, and reported deterioration in six health measures and the differences between boys and girls**

Scale	Boys (%)			Girls (%)			Difference in proportions (boys vs girls; 95% confidence interval)				
	improvment	stable period	deterioration	improvment	stable period	deterioration	improvment	stable period	deterioration	P	effect size/ Cohen's H
Self-rated health	13	68	19	19	65	16	0.01 - 0.11	-0.04 - 0.09	-0.02 - 0.08	0.031[i]	0.164
Vitality	32	13	55	39	13	48	0.04 - 13.6	-0.04 - 0.05	0.01 - 0.15	0.033[i]/0.024[d]	0.146[i]/0.140[d]
Mental health	27	13	60	34	10	56	0.01 - 12.8	-0.01 - 0.07	-0.03 - 0.11	0.041[i]	0.152
Long-term well-being	40	36	24	45	34	21	-0.13 - 0.01	-0.04 - 0.09	-0.03 - 0.09		NA
Health complaints	38	29	33	44	18	38	-0.04 - 0.04	0.05 - 0.17	-0.12 - 0.01		NA
Long-standing illness	8	86	6	8	86	6	-	-	-	-	NA

**Abbreviations: i – improvement; d – deterioration.*Mean±standard deviation.*

The proportions of girls who reported an improvement, remained stable, and reported a deterioration in long-term well-being, health complaints, and long-standing illness were not significant in comparison with boys. The differences in proportions between boys and girls who remained stable and who reported a deterioration in self-rated health and mental health were not significant. Also, the difference between stable boys and girls on vitality was not significant. However, the proportion of girls who reported an improvement in perceived self-rated health (19%) differed significantly from the proportion of boys who reported an improvement (P= 0.031; 95% CI, -0.01 to -0.11). The proportion of girls who reported an improvement in vitality between the age of 15 and 19 (39%) differed significantly from the proportion of boys (32%) (P=0.033; 95% CI, 0.04-13.6). Furthermore, the difference in the proportion of boys and girls who reported a deterioration in vitality (55% vs 48%) was significant (P= 0.024; 95% CI, 0.01-0.15). The proportion of girls who reported an improvement in mental health (34%) differed significantly from that of boys (27%) (P= 0.041; 95% CI 0.01-12.8). However, although significant, these differences were, according to the thresholds of Cohen's "h" effect size, trivial in size.

Discussion

In the current study, boys reported a small deterioration in self-rated health. Both boys and girls reported a deterioration in vitality and mental health. However, the change in vitality was small for boys and trivial in size for girls. Furthermore, the extent of deterioration in mental health in boys was moderate, compared with the small extent of deterioration in girls. Both boys and girls reported a moderate deterioration in long-term well-being according to the thresholds of Cohen's effect size. Thus, in the three domains of self-reported health, boys reported more deterioration than girls.

Contrary to the general trend of deterioration in health status in adolescence observed in the literature, we detected substantial proportions of boys and girls who reported an improvement in health. For the health indicators used in this study, the proportions of adolescents who reported an improvement ranged from 8% to 40% in boys and from 8% to 45% in girls. Four out of 18 comparisons between boys and girls who reported an improvement were, although significant, trivial in size. Most of 19-year-old adolescents refused to participate in the research dealing with questions on personal health, psychological wellbeing, and risky health-related behaviour. Furthermore, at the age of 19 many changed the place of residence to go to study or start a pro-fessional career, which resulted in the return of a substantial number of mailed questionnaires, with the annotation "address unknown." Nevertheless, 844 (46%) subjects filled out a ques-tionnaire that was identical to the questionnaire they filled out at the age of 15. Female adolescents were more likely to participate as they were general secondary school students, who are presumed to have a better health status. Responders had worse health status according to SF-36 and VOEG scales. Still, these differences were, according to Cohen's thresholds, trivial in size.

The main purpose of this study was to perform a longitudinal comparison of self-rated health status of adolescents from age 15 to age 19. Subjects were their own controls in a repeated measurement. The study also focused on analyzing gender differences and identifying proportions of male and female adolescents who reported an improvement, remained stable, and reported a deterioration. Both boys and girls reported deterioration in vitality and mental health between the age of 15

and 19, while only boys reported a deterioration in self-rated health. The prevalence of perceived health complaints and long-standing illness at 19 remained unchanged since baseline.

In comparison with boys, girls reported having worse health in five health indicators both at the age of 15 and at the age of 19, which is in line with several previous studies (Cullen et al. 1999; Lahelma et al. 1999; Hidalgo et al. 2000; Ustun 2000; Marcell et al. 2002; Madarasova Geckova et al. 2003; Sleskova et al. 2005). However, in this study, differences in health indicators between boys and girls were not significant between the baseline and follow-up. According to the literature, it could be assumed that there would be a general lifelong trend of deterioration of health with increasing age. This general trend is disturbed by some further deterioration in the periods of major life transitions (Mechanic and Hansell 1987; Hidalgo et al. 2000; Simeoni et al. 2001; Wade et al. 2002; Currie et al. 2004; Wight et al. 2004). Worse health in adolescents and adult females seems to be a general finding. However, although it is widely accepted, this belief should not be generalized for all health indicators. This study shows that for both sexes, scores on mental health measures (eg, vitality, mental health, long-term well-being) deteriorated, while the scores on physical health measures (number of physical health complaints and long-standing illness) did not change between the baseline (age 15) and follow-up (age 19). Only boys reported a significant deterioration in self-rated health. The period of life investigated in this study is a period of important life transition associated with numerous stressful events, ie, preparing for end-of-school exams, going to university, or looking for a job. Studies covering health in adolescence mostly reported either stability or worsening of health status in the period between the 15th and 19th year (Mechanic and Hansell 1987; Simeoni et al. 2001; Wade et al. 2002). Furthermore, some studies reported alternating periods of worsening, as well as plateaus, in health status (Hankin et al. 1998; Wade et al. 2002; Wight et al. 2004).

To our knowledge, no studies have detected substantial improvement in self-reported health during this phase of adolescence. However, our study has shown that the health status of some subgroups of adolescents improved with increasing age. Adolescence is a time in which life-style and health-related behaviors are being established. A substantial part of research efforts are aimed at studying young adolescents at risk of getting involved in smoking, drug, and alcohol use, which may negatively affect health. However, improvement in health in the current study may be related to a health-protective lifestyle. Friis et al. (2002) found in a 4-5-year-long lon-gitudinal study that absence of stressful school and family events was related to improvement in depressive disorders in respondents aged 1424 years at baseline.

With regard to the statistical conclusion validity, the most relevant strength of this study is its follow-up nature, where each participant serves as his or her own control. Due to high costs and complex management, longitudinal studies are not very common, especially studies focusing on young people. Most information about health of this age group is obtained by cross-sectional studies, whereas less data are obtained by longitudinal studies. The main limitation of this study is the low response rate at follow-up. This is common in longitudinal studies among school-attending young adolescents, since a large proportion move to study or work elsewhere. Although differences in gender and education between response and non-response groups did not occur due to sampling error, they were small according to standardized indices of differenc-es between groups (effect sizes). Since in large samples, small or

trivial differences are likely to become significant, we have come to the conclusion that the external validity is not hampered by unacceptably large differences.

Another strength of this study is the sample size. The sample was randomly selected from each type of secondary schools in Slovakia. The sample represents the school population of school-attending adolescents in eastern part of Slovakia. Differences between the ages of 15 and 19, due to sample fluctuation or chance, were not used to estimate the change with effect sizes.

The importance of this study is that we identified not only deterioration, but also improvement and stability in self-reported health among boys and girls between the ages of 15 and 19. More longitudinal studies, with shorter time intervals, should be designed to determine factors that may explain changing mental and physical health and their (causal) paths with structural equation modelling. Outcomes of such studies should provide support for a well-tailored and evidence-based health policy for the adolescent population and relevant strata.

Chapter 4

Changes in socioeconomic differences in adolescent health between ages 15 and 19 years: a longitudinal study*

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* Submitted

Abstract

Introduction

Evidence on changes in socioeconomic differences in health during adolescence is scarce. The aim of this study was to assess whether socioeconomic differences in self-reported health (SRH) changed between the ages of 15 and 19 by gender in a longitudinal study.

Study design

We collected baseline data in 1998 on first-year students from 31 secondary schools in Kosice, Slovakia, and follow-up data four years later. The sample with complete data consisted of 844 respondents (42.7% males; mean age at baseline 14.9 and at follow-up 18.8; response rate at follow-up 45.5%).

Methods

Socioeconomic position (SEP) was measured by the respondents' educational level and current employment status, and parental educational and occupational status. The relation between SEP and SRH was assessed performing binary logistic regression models.

Results

Socioeconomic differences in self-rated health among males aged 15 were very small, and this pattern was similar ate age 19. Among females, a traditional gradient of socioeconomic differences in SRH was found at age 15 and became more distinct at age 19.

Conclusion

The pattern of socioeconomic differences in SRH among both males and females remained primarily stable from 15 to 19.

Introduction

While social gradients in health are well established during childhood (Levin et al. 2011; Raat et al. 2011; DiLiberti 2000), several studies have concluded that adolescence is characterised more by the absence than the presence of class gradients in health (West and Sweeting 2004; Chen et al. 2002; Tuinstra et al. 1998). However, other studies have reported significant inequalities in adolescent health (Piko 2007; Torsheim et al. 2004). Later on, in adulthood, socioeconomic differences in health are clearly present again (Majer et al. 2011; Stirbu et al. 2011; Mackenbach et al. 1997). The period of adolescence may be especially important in the shaping of the socioeconomic gradient. However, despite its importance, only a few follow-up studies of adolescents have investigated changes in socioeconomic differences in health during adolescence (Huurre et al. 2005; Boonstra 2001).

Three broad conceptual models hypothesise when and how implications of SEP-related physical and psychosocial exposures during childhood and adolescence might be of interest for adult health (Cohen et al. 2010; Kawachi et al. 2002). Firstly, the latent effects/timing model hypothesises that the early life environment affects adult health independent of the intervening experience (Pollitt et al. 2005). According to this model, SEP-related factors have the greatest influence on adult health if experienced during specific developmental periods defined as age ranges (e.g., from birth to three years of age) or more broadly as periods of development (e.g., childhood, adolescence). Secondly, the pathway effects/change model hypothesises that the early life environment sets individuals onto life trajectories that in turn affect their health status over time (Smith 1999). This model hypothesises that the direction of SEP mobility across childhood and adolescence has important implications for adult health outcomes. Predictions of this model suggests that upward mobility, a change from lower to higher levels of SEP, would result in better adult health. Thirdly, the cumulative effects/accumulation model is based on the presumption that the intensity and duration of the exposure to unfavourable environments adversely affects health status, according to a dose-response relation (Ben-Schlomo and Kuh 2002). The accumulation model suggests that the detrimental effects of low SEP accrue throughout the life course in such a way that the risk for poor adult health increases with an increasing intensity of socioeconomic disadvantage and with an increasing duration of exposure to such disadvantage. In contrast to the firstly mentioned timing model, this accumulation model is indifferent to when during childhood and adolescence SEP-related exposures occur. Rather, the accumulation model considers risk in proportion to the total dosage of the exposure to SEP-related adversities over the course of childhood and adolescence (Hertzman 1999).

This particular study focuses on changes over time in socioeconomic inequalities in health among adolescents in a Central European country. Inspired by the Scotland Twenty-07 Study (Sweeting and West 1994), in 1993 in Groningen (The Netherlands) a study started on inequalities in socioeconomic health and in health risk behaviour among Dutch adolescents (Tuinstra et al. 1998). With the aim of comparing the results of this Dutch study with data from Slovakia, a Central European country, a similar study with comparable indicators and a similar study sample was performed in Slovakia in 1997 (Geckova et al. 2001). In contrast to the results from many Western European countries, where no socio-economic health and health risk

behaviour inequalities among adolescents were found (West and Sweeting 2004; Chen et al. 2002; Tuinstra et al. 1998), Geckova (2004) reported the presence of such inequalities in Slovak 15-year-olds. Because the work of Geckova et al. (2004) was the first study on inequalities in Slovakia, many questions remained open.

Patterns of socioeconomic inequalities may vary by gender, although findings on this are mostly inconsistent. Mustard et al. (2003) performed a systematic review of 136 papers published in the period 1970 to 2000 about observational cohort studies using all-cause or cause-specific mortality among people age 25-64 years as a health indicator for six developed countries (Denmark, Norway, Sweden, Finland, the United States and the United Kingdom). They concluded that gender differences in socioeconomic inequality in mortality existed according to most reviewed studies, but that the findings were sensitive to the choice of the inequality measure. Also, according to other studies using different health measures, the magnitude and explanations for gender differences in SEP health inequalities are likely to vary according to life stage and health measure (Huurre et al. 2007; Lahelma et al. 1999; Matthews et al. 1999; Rahkonen et al. 1995; Stronks et al. 1995; Rahkonen and Lahelma 1992).

The size of socioeconomic health differences seems to be age-specific, with a special role for the period of adolescence. Previous studies have also suggested that socioeconomic inequalities are gender related. Despite this, only a few follow-up studies of adolescents have focused on changes in socioeconomic differences in health during this crucial period of life. The aim of this study was to assess whether socioeconomic differences in self-reported health (SRH) changed between the ages of 15 and 19 by gender in a longitudinal study.

Methods

Sample and procedure

The data used in this study were derived from a longitudinal study on 'Socioeconomic inequalities in health' (Geckova 2002). Data for the baseline study (T1) were collected in autumn 1998. The sample at baseline consisted of 2616 (52.4% males) first-year students at 31 secondary schools located in Kosice, Slovakia. The mean age of the participants at baseline was 14.9 (SD=0.62) years. The sample was stratified according to gender and type of secondary schools in Slovakia. Individual schools were selected randomly. Respondents completed the questionnaire at school, in their classrooms, under the guidance of field workers and in the absence of teachers.

Respondents who agreed at T1 to participate in the second wave (N=1850) received self-administered questionnaires by postal mail in December 2002 together with a stamped return envelope. One reminder was sent to those who did not reply. We received back 844 usable questionnaires (42.7% males), which represented a response rate of 45.5%. The mean age of the participants was 18.8 (SD=0.55) years. Differences in response rate by parental SEP regarding Cohen's W were trivial, except for gender (w=0.107; small) and type of school at T1 (w=0.224; small). Of those who participated in the second wave of the study 29.3% were from grammar schools (22% at T1), 45.3% were from specialised secondary schools (42.4 at T1) and 25.4% were from apprentice schools (35.7% at T1). A more detailed description of the socioeconomic characteristics of respondents is given in Table 1.

Table 1 Gender, age and socioeconomic position characteristics at baseline and follow-up[1]

		Measurement point			
		T1 % (N)	T2 drop-out % (N)	T2 participants % (N)	Cohen's w[2]
Total		100 (1850)	100 (1006)	100 (844)	
Gender	Males	48.6 (899)	53.5 (583)	42.8 (361)	0.107
	Females	51.4 (951)	46.5 (468)	57.2 (483)	
Age	Mean (SD)	14.9 (0.62)	18.8 (0.55)	18.8 (0.55)	
Respondents' education level	Grammar	23.8 (440)	19.1 (193)	29.3 (247)	0.224
	Specialised secondary	43.4 (802)	41.7 (420)	45.3 (382)	
	Apprentice	32.7 (608)	39.1 (393)	25.5 (215)	
Current employment status	Student	n.a.	n.a.	66.3 (558)	n.a.
	Employed	n.a.	n.a.	12.6 (106)	
	Unemployed	n.a.	n.a.	21.1 (178)	
Parents' highest occupational level	High	29.8 (538)	29.0 (283)	30.8 (255)	0.052
	Medium	36.2 (653)	34.8 (339)	37.9 (314)	
	Low	33.9 (612)	36.2 (353)	31.3 (259)	
Parents' highest education level	High	26.0 (477)	25.7 (255)	26.4 (222)	0.042
	Medium	49.7 (910)	48.3 (479)	51.2 (431)	
	Low	24.3 (445)	25.9 (257)	22.4 (188)	
Self-rated health (good, bad, very bad)	Males	31.1 (424)	31.3 (314)	30.6 (74)	0.006
	Females	44.9(558)	45.3 (345)	44.3 (213)	0.010

1 Due to rounding not all percentages add up to 100%

2 Cohen's w is a measure of the strength of the effect of a characteristic on the outcome. It is independent from the sample size and is expressed as effect size (ES). It should be interpreted as follows: if w < 0.1 the effect is trivial; if w ranges from 0.1 to 0.3 the effect is small; if w ranges from 0.3 to 0.5 the effect is moderate; and if w ≥ 0.5 the effect is large.

n.a. – not available

T1 – baseline measurement; T2 – follow-up

Measures

Indicators of socioeconomic position (SEP)

Four indicators of the adolescents' SEP were used: 1) respondent's own current educational level at T1, 2) respondent's own current employment status at T2, 3) highest parental educational level, and 4) parental occupational status.

Educational level of respondents was defined as the highest level of education attained. It was classified as I. Grammar school, II. Specialised secondary school, III. Apprentice or elementary school only. Current employment status of respondents was classified as: I. Student, II. Employed, III. Unemployed. Parental educational level was defined as the highest level of education attained by either parent: I. University, II. Secondary high school, III. Apprentice or elementary school only. Parental occupational status was defined as the highest level of occupation attained by either parent. The level of occupation was derived by coding job descriptions according to the ISCO 88 classifications (International Standard Classification of Occupations). The ten ISCO categories were clustered into three groups: I. High SEP – 1. Legislators, 2. Senior officials and managers; II, Medium SEP – 3. Technicians and associate professionals, 4. Clerks and 0. Armed forces; III. Low SEP – 5. Service workers and shop and market sales workers, 6. Skilled agricultural and fishery workers, 7. Craft and related trades workers, 8. Plant and machine operators and assemblers and 9. Elementary occupations.

Measures of health

Self-rated health (SRH) is widely used in health studies because it is generally accepted as a good predictor of morbidity and mortality (Andersen et al. 1998; Idler and Benyamini 1997). Respondents rated their health using the five-point Likert scale from 1 (excellent) to 5 (bad). For the purpose of the analyses, the variable was dichotomised (excellent and very good health/and good, fairly good and bad), the latter three forming poor SRH. We adhered to cut-offs that had been used in previous studies (Salonna et al. 2008; Bacikova-Sleskova et al. 2007; Geckova 2002; Tuinstra et al. 1998).

Statistical analyses

Changes in socioeconomic gradients in SRH were analysed using logistic regression. Three regression models were explored – Model 1 to examine the effect of SEP on SRH at T1; Model 2 to examine the effect of SEP on SRH at T2; and Model 3 to examine the potential differences in changes in socioeconomic gradi¬ents in SRH between ages 15 and 19 by analysing the effect of SEP on SRH at T2 controlled for SRH at T1. The procedure was repeated for all four socioeconomic indicators, separately for males and females. Both the analyses at T1 and T2 were limited to those adolescents on whom data for both measurements were available to enable comparisons across both ages.

The analyses were all done using the statistical software package SPSS version 16.1 (SPSS Inc. 2007). Using MlWin 2.02 (Rasbash et al. 2005) we found no indications for a clustering by school at baseline for the measurements at follow-up.

Results

Among males, small (statistically not significant) traditional socioeconomic gradients of poor SRH were found for respondents' own educational level, for parental educational and for parental occupational level at age 15 (Table 2). Socioeconomic gradients of poor SRH were similar at age 19. According to the current employment status, students reported a much lower occurrence of poor self-rated health than their employed or unemployed peers at both T1 and T2. However, the gradients did not change in time, as is shown by the final columns.

Among females, traditional statistically significant socioeconomic gradients were found (the lower the socioeconomic position, the higher the prevalence of poor health) for respondents' educational level, parental educational level and parental occupational level both at T1 and T2 (Table 3). No statistically significant socioeconomic gradient was found for respondents' current employment status at T1, but such a gradient did appear at T2. Socioeconomic gradients in SRH at T2 remained stable even after controlling for SRH at T1. The values of the odds ratios indicate that the SEP-SRH gradients increased between ages 15 and 19.

Discussion

The main purpose of this study was to describe changes over time regarding self-rated health according to SEP in a cohort of adolescents between their 15th and 19th years of life, separately for males and females. We found almost no significant socioeconomic differences in self-rated health among males at age 15 and at age 19. Among females statistically significant socioeconomic gradients were found at age 15, and these became more distinct at age 19.

As the pattern of socioeconomic differences in SRH among males remained stable from year 15 to year 19, we could frame the relation between SEP and SRH of adolescents into the latent effects/timing model. This model hypothesises that SEP differences in health are established early in life and remain fairly constant throughout childhood and adolescence. The relation between SEP and health consistent with this model was previously described, for example, by Halldorsson et al. (2000) for chronic conditions and physical health complaints and by Starfield et al. (2002) and Case et al. (2005) for self-reported health. However, these studies used cross-sectional data; thus they assessed an age-effect compared to a cohort effect like in our study, and they did not focus on gender differences.

As mentioned above, females from lower socioeconomic groups reported a higher prevalence of poor SRH than those from higher socioeconomic groups, resulting in bigger socioeconomic gradients in SRH at age 19 than at age 15. This finding could be framed into the cumulative effects/accumulation model, which hypothesises that the risk for poor adult health increases with an increasing intensity of socioeconomic disadvantage and with an increasing duration of exposure to such disadvantage. The explanation could be a combination of two factors. Firstly, it could be explained by the emergence of both stress sensitivity and depressive symptoms among females during early adolescence (McClure et al. 2004; Cyranowski et al. 2000). The emergence of differences in the prevalence of mental health problems starts between the age 10-15, during pubertal development (Bosch et al. 2009; Andersen and Teicher 2008; Kuehner 2003). This specific period is suggested as playing a role due to hormonal

Table 2 Socioeconomic gradients of poor self-rated health at ages 15 (T1) and 19 (T2) years among males (logistic regression) (n=361)

		Poor Self-rated health at					
		T1		T2		T2 adjusted for T1	
		OR1	95.0% CI	OR1	95.0% CI	OR	95.0% CI
respondents' educational level2	*grammar*	1.00		1.00		1.00	
	specialised	1.16	(0.66 - 2.05)	0.96	(0.57 - 1.63)	0.90	(0.52-1.56)
	apprentice	1.78	(0.98 - 3.22)	1.41	(0.81 - 2.48)	1.23	(0.68-2.22)
current employment status3	*student*	**1.00**		**1.00**		1.00	
	employed	**2.48**	**(1.18 - 5.24)**	**2.07**	**(0.99 - 4.34)**	1.71	(0.79-3.70)
	unemployed	**1.98**	**(1.12 - 3.50)**	**1.88**	**(1.08 - 3.29)**	1.65	(0.92-2.96)
parental educational level	*high*	1.00		1.00		1.00	
	medium	1.12	(0.65 - 1.92)	1.20	(0.72 - 1.99)	1.18	(0.69-2.00)
	low	1.33	(0.69 - 2.59)	1.19	(0.63 - 2.26)	1.06	(0.54-2.08)
parental occupational level	*high*	1.00		1.00		1.00	
	medium	1.10	(0.62 - 1.93)	0.86	(0.50 - 1.45)	0.82	(0.47-1.43)
	low	1.52	(0.83 - 2.76)	1.11	(0.63 - 1.95)	0.96	(0.53-1.74)

[1]*Figures in bold indicate that a variable contributes to the logistic model at p<0.05*
[2]*respondents' educational level at T1*
[3]*respondents' employment status at T2*

changes, specifically the increase in female sex hormones. The findings of Bosch (2011) show that the transition to adolescence is accompanied by a substantial rise in depressive problems in girls compared to boys and show that girls' hypothalamic-pituitary-adrenal axis is more sensitive to long term alterations caused by chronic stress. Secondly, the higher level of chronic stress among individuals with lower socioeconomic status (McEwen and Gianaros 2010)could also explain a part of the socioeconomic differences.

Among females, a traditional gradient of socioeconomic differences in SRH was found at age 15 and became more distinct at age 19. Thus, our findings about females could potentially fit into the pathway effects/change model which hypothesises that the early life environment sets individuals onto life trajectories that in turn affect health status over time (Smith 1999). Our findings regarding males did not fit into this model. Even though this concept may not seem appropriate for the period of adolescence or young adulthood, it could still be useful over a longer period. In general, adolescence is characterised by better health status compared to childhood and adulthood. Thus, the effects of early environment on health could be obscured to some extent during adolescence.

Strengths and limitations

This study has some strengths and limitations. A major strength of our study is its longitudinal design. The main limitation of this study is the relatively low response rate. Compared to females and better-educated males, low-educated males responded slightly less. However, the differences in response rates by three measures of SEP were trivial and for own education relatively small; thus biased results due selective non-response are less probable. In particular, a substantial number of respondents became simply unreachable because of study or work in another part of the country or abroad. This may explain some of the differences in the response rate we found in terms of gender and SEP, but probably only a part of them.

Implications

We found no socioeconomic differences in health among males ages 15 and 19 even though they are well described during adulthood. To track the onset of socioeconomic differences, further research involving more psychosocial factors should be performed in order to achieve a better understanding of sex differences in socioeconomic gradients during adolescence. Also more longitudinal studies, with shorter time intervals and also overlapping childhood and adulthood, should be designed to determine factors that may explain changing mental and physical health and their (causal) paths. Moreover, evidence on the social determinants of health reflect a wide range of factors, including the culture and history of a country and its political environment. Understanding the impact that the context potentially has on health inequities and the effectiveness of interventions requires a rich evidence base that includes both qualitative and quantitative data (MEKN 2007).

Conclusion

Our follow-up study, performed on a sample of adolescents, revealed that the socioeconomic differences in poor self-rated health of males in the 15th year of

Table 3 Socioeconomic gradients of poor self-rated health at ages 15 (T1) and 19 (T2) years among females (logistic regression) (n=483)

		Poor Self-rated health at					
		T1		T2		T2 adjusted for T1	
		OR1	95.0% CI	OR1	95.0% CI	OR1	95.0% CI
respondents' educational level[2]	*grammar*	**1.00**		**1.00**		**1.00**	
	specialised	**1.46**	**(0.95 - 2.24)**	**1.48**	**(0.95 - 2.30)**	**1.36**	**(0.86-2.16)**
	apprentice	**2.21**	**(1.33 - 3.68)**	**3.30**	**(1.96 - 5.55)**	**2.87**	**(1.67-4.92)**
current employment status[3]	*student*	1.00		**1.00**		**1.00**	
	employed	1.09	(0.65 - 1.84)	**1.23**	**(0.73 - 2.08)**	**1.22**	**(0.71-2.10)**
	unemployed	1.50	(0.97 - 2.32)	**1.89**	**(1.22 - 2.93)**	**1.76**	**(1.12-2.78)**
parental educational level	*high*	**1.00**		**1.00**		**1.00**	
	medium	**1.65**	**(1.04 - 2.62)**	**1.80**	**(1.12 - 2.88)**	**1.63**	**(1.00-2.66)**
	low	**3.34**	**(1.94 - 5.74)**	**2.72**	**(1.58 - 4.68)**	**2.08**	**(1.18-3.66)**
parental occupational level	*high*	**1.00**		**1.00**		**1.00**	
	medium	**1.43**	**(0.88 - 2.31)**	**1.34**	**(0.82 - 2.19)**	**1.24**	**(0.75-2.06)**
	low	**2.15**	**(1.31 - 3.54)**	**2.34**	**(1.41 - 3.89)**	**2.01**	**(1.19-3.39)**

[1]*Figures in bold indicate that a variable contributes to the logistic model at p<0.05*
[2]*respondents' educational level at T1*
[3]*respondents' employment status at T2*

life were very shallow, and this pattern remained stable until their 19th year of life. On the other hand, the traditional gradient of socioeconomic differences in poor self-rated health (the lower the socioeconomic position, the higher the prevalence of poor health) among females became more distinct from 15th year of life until their 19th year of life.

Chapter 5

Socioeconomic differences in self-rated health decreased from 1998 to 2006 among Slovak adolescents*

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* Submitted

Abstract

Background:

Societal changes might impact population health, particularly inequalities in health. Our aim was to compare the magnitude of socioeconomic differences in self-rated health among Slovak adolescents in 1998 and 2006.

Methods:

We obtained data from two samples of adolescents from the Kosice region. Data from the first sample were collected in 1998 (n=2616, 52.4% males, mean age 14.9), and from the other sample in 2006 (n=1081, 47.0% males, mean age 14.3). Socioeconomic status was measured using the highest education completed by parents. Socioeconomic differences in health were analysed using logistic regression, separately for male and female. The magnitudes of socioeconomic differences in health were measured by indices of dissimilarity.

Results:

We found significant socioeconomic differences in self-rated health that were unfavourable for the lower socioeconomic groups in both males and females in 1998, but only among females in 2006. In both genders socioeconomic differences in self-rated health as measured by the index of dissimilarity decreased. For males it dropped from 5.34 to 3.82, and for females from 7.05 to 4.65.

Conclusion:

Socioeconomic differences in self-rated health decreased from 1998 to 2006 among Slovak adolescents. This might be a sign of societal stabilization.

Introduction

In the early 1990s Central European countries went through a turbulent period of political, economic and health care reforms connected with a severe downturn of economy, increasing unemployment rate and decreasing standard of living. After this initial period of habituation to the market economy the CE countries' economies stabilized and later on their Gross Domestic Product increased with a simultaneous decline in unemployment and positive expectations from the accessing to the European Union (EU). Superficially, this last process did not cause much economic troubles, but for people living in the new EU member states it was highly relevant for their perception of the newly acquired autonomy.

Childhood and adolescence adversity during the political regime change in the 1990s may be associated with different health consequences than adversity experiences by the generation of children and adolescents exposed to low socioeconomic environment later on. Diewald et al. (2006) have traced the consequences of the transformation of Eastern Germany, these continuous event histories show a much higher degree of turbulence than do cross-sectional comparisons and panel studies. Former qualifications, skills, gender, and age at the time of the transformation played the strongest role in trajectories after the system rupture. Silbereisen et al. (2002) compared Western Germany and Poland regarding the effects of family income loss on depressive mood and transgression among adolescents. Their study showed that, in contrast to Western Germany, in Poland a decline of family income did not result in more depressive moods of fathers and, consequently, also not of children. Comparison of two cohorts on young Slovak adolescents performed by Pitel et al. (2011) showed a shift in health related behaviour patterns between cohorts from 1998 and 2006, they manifested in diminished gender differences in adolescent health-related behaviour.

Societal changes might indeed impact population health, and particularly inequalities in health within society. From this point of view it is very interesting to monitor the effect of societal changes on gaps in health. Particularly adolescence seems to be an important period with regard to socioeconomic inequalities in health. It is a period when personality, coping strategies, values, lifestyle and future socioeconomic position in particular are formed via success or failure in the educational system or on the job market (Bacikova-Sleskova et al. 2007). Adverse circumstances experienced by low socioeconomic groups in childhood and adolescence may be very different in one generation vs. another and therefore will not have similar health effects (Galobardes 2004).

The aim of this study is to compare the extent of socio-economic differences in self-rated health among Slovak adolescents in 1998 and 2006 separately for boys and girls to demonstrate the possible association between societal changes and health inequity. The first measurement took place 8 years after Velvet Revolution and in 2006 Slovakia was already two years a member state of EU.

Methods

Sample

Two cross-sectional surveys on adolescents were performed in Kosice (235,000 inhabitants, Eastern part of Slovakia) in 1998 and in 2006, using a similar methodology. In 1998, data were collected among first year students at secondary schools. The sample was stratified according to the type of school: the proportion of the five educational tracks of the regular Slovak school system was maintained. Individual schools were selected at random. Approximately 20% of the schools did not wish to participate in the data collection. In the 31 schools which did agree to take part, data were collected in all available classes. A total of 2616 questionnaires were returned (age range: 13.75-17.50 years; mean: 14.86 years; SD: 0.62; 52.4% boys). In 2006, due to changes in the educational system (the introduction of a 9- year elementary education instead of an 8-year one), 8th and 9th year students were approached at randomly chosen elementary schools. In all, 1081 questionnaires were returned in which gender was specified (age range: 13.09-16.83 years; mean: 14.33 years; SD: 0.62; 47.0% boys). Table 1 shows the characteristics of the study sample.

Participation of children was fully voluntary and on anonymous basis. Parents were informed prior to the study via the school administration and could opt out if they disagreed with their child's participation. Respondents completed the questionnaire at school, in their classrooms, in the absence of their teachers and under the guidance of field workers. The response rates of the students of the schools that participated were 96.3% in 1998 and 93.0% in 2006. Non-response was due to illness and other types of absence.

Table 1 Characteristics of the study variables

cohort (n)	1998 (2578)		2006 (1821)	
	Number	%	Number	%
Gender				
Male	1348	46.6	893	49.0
Female	1230	53.4	928	51.0
Age*	14.86	(0.62)	14.38	(0.61)
Parents' education level				
University	654	25.4	667	36.6
Secondary high school	1302	50.5	927	50.9
Apprentice or elementary school only	622	24.1	227	12.5
Self-rated health				
Good (excellent, very good)	1609	62.4	1189	65.3
Poor (good, fair, bad)	969	37.6	632	34.7

** mean (SD)*

Measures

As indicator of socio-economic status we used the parents' education level. This concerned the parent with the highest level of education attained. It was classified as – I. University, II. Secondary school, and III. Apprenticeship or elementary school only. Self-rated health (SRH) is widely used in health studies because it is generally accepted as a good predictor of morbidity and mortality (Idler and Benyamini 1997; Andresen et al. 2003). Respondents rated their health using a five-point Likert scale from 1 (excellent) to 5 (bad) in the 1998 and 2006 samples. For the purpose of the analyses the variable was dichotomised as follows: excellent and very good health vs. good, fairly good and bad for both samples. Good, fairly good and bad SRH was categorised as 'poor' SRH. We adhered to cut-offs that had been used in previous studies (Tuinstra et al. 1998; Geckova et al. 2004; Bacikova-Sleskova et al. 2007; Salonna et al. 2008a).

Results

In Table 2 the results of the logistic regression from parental highest education on poor SRH are shown. Positive socioeconomic gradients in SRH were found in both males and females in 1998 although they are significant only for females.

We noticed a decreasing trend of the indexes of dissimilarity (Table 2). Among males the indexes dropped from 5.34 in 1998 to 3.82 in 2006. The trend was even more visible among females, for them indexes dropped from 7.05 in 1998 to 4.65 in 2006.

Discussion

The aim of this study was to compare the extent of socio-economic differences in self-rated health among Slovak adolescents in 1998 and 2006 separately for boys and girls. Significant socioeconomic differences in self-rated health, unfavourable for lower socioeconomic groups, were shown among both males and females in 1998 but only among females in 2006. Comparing the two samples of adolescents showed a decrease of socioeconomic differences in health among males as well as among females. Socioeconomic differences were larger and their decrease was more visible among females than among males: The index of dissimilarity dropped from 5.34 to 3.82 among males, and from 7.05 to 4.65 among females.

Differences in adverse circumstances experienced during the two assessment periods might be an explanation for the observed findings. Whereas adolescents from the cohort 1998 were born at average 6 years before the system change and spent the following 8 years of their lives during the most turbulent period of transformation, their counterparts from 2006 cohort were born 2 years after the political system reform. In particular low socioeconomic groups may have been vulnerable for the socioeconomic uncertainty during this turbulent period.

Changes regarding the labour market, in particular concerning the unemployment rate may play a pivotal role in this explanation. In 1989 most Central European countries had an unemployment rate of practically zero due to legislation. Even though full employment was partially artificial, society had no or a very vague experience with unemployment as a phenomenon and its management or coping. The transition led to an unemployment rate of about 16% in 1998, when the first

Table 2 Prevalence rates for reporting poor SRH, indexes of dissimilarity (ID), age adjusted odds ratios (OR) and 95% confidence intervals by highest education of parents.

		Males				Females			
Cohort	Parents' education level	n	%	ID	OR (95.0% C.I.)	n	%	ID	OR (95.0% C.I.)
1998	University	90/343	**26.2**	5.34	1	97/279	**34.8**	7.05	1
	Secondary high school	205/678	**30.2**		1.21 (0.89-1.63)	268/624	**42.9**		1.35 (1.05-1.89)
	Apprentice or elementary school only	124/327	**37.9**		1.51 (1.06-2.14)	185/327	**56.6**		2.24 (1.59-3.16)
2006	University	97/365	**26.6**	3.82	1	106/302	**35.1**	4.65	1
	Secondary high school	126/435	**29.0**		1.05 (0.76-1.44)	195/492	**39.6**		1.18 (0.87-1.59)
	Apprentice or elementary school only	37/93	**39.8**		1.65 (1.01-2.72)	71/134	**53.0**		2.00 (1.31-3.03)

data collection was performed. In the Kosice region, the unemployment rate was even higher – 21% (Ochránková et al. 1998). Soon after, in 2001, the unemployment rate reached its peak – about 19% in Slovakia and 26% in Kosice region. Then the unemployment rate drastically dropped. By the time of the second data collection (in 2006), the unemployment rate in Slovakia was about 9% and in the Kosice region about 15% (Ochránková 2006).

Changes regarding the labour market, in particular concerning the unemployment rate may play a pivotal role in this explanation. In 1989 most Central European countries had an unemployment rate of practically zero due to legislation. Even though full employment was partially artificial, society had no or a very vague experience with unemployment as a phenomenon and its management or coping. The transition led to an unemployment rate of about 16% in 1998, when the first data collection was performed. In the Kosice region, the unemployment rate was even higher – 21% (Ochránková et al. 1998). Soon after, in 2001, the unemployment rate reached its peak – about 19% in Slovakia and 26% in Kosice region. Then the unemployment rate drastically dropped. By the time of the second data collection (in 2006), the unemployment rate in Slovakia was about 9% and in the Kosice region about 15% (Ochránková 2006).

Own unemployment as well as parents' unemployment particularly father's unemployment, have been shown to negatively affect the health of adolescents and young adults (Sleskova et al. 2006; Bacikova-Sleskova et al. 2007). The risk for unemployment is unequally distributed in society; less educated are at a higher risk to be unemployed (Gesthuizen et al. 2011). This might explain the larger SE inequalities in health among adolescents in 1998 and a trend towards closing the gap might be observed in 2006. If this hypothesis is true, then the economic crisis associated with the increasing unemployment rate might be mirrored in deepening of SE health inequalities not only among adults, but also among their offspring.

The period of regime change in the nineties was related to a break-up of the health care system in several countries (Hancock and Logue 2000). However, it has to be noted that even in times of the most complicated economic reforms in Slovakia, the healthcare system in fact did not collapse (Hlavačka et al. 2004), thus the affordability of adequate health care could not be the sole factor playing a role in the SEP health relationship. Nevertheless, period of health care reform in Central and Eastern European countries seems to be associated with pro-rich inequalities in the use of health services (Habicht et al. 2009; Pristas et al. 2009; Jankovic et al. 2010) and health inequalities might be attributable to differences in access to health care (Mackenbach et al. 2007; Stirbu et al. 2010).

The decrease of socioeconomic differences in adolescents' health might mirror societal changes, e.g. societal stabilization and as such this findings might serve as stimulation for further research testing possible mechanisms and pathways how changes in the socio-political context might influence gaps in health.

Strengths and limitations

Besides the excellent response rate, this study provides information about socioeconomic shifts in adolescent health from Central Europe, where such studies have been – and still are – very rare. A possible limitation is the shift in distribution based on parental education, particularly increased proportion of parents with university education. However, shifts are rather small and our use of the index of dissimilarity as a summary measures is likely to have eliminated any residual effect.

Chapter 6

Social inequalities in changes in health-related behaviour among Slovak adolescents aged between 15 and 19: A longitudinal study*

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Abstract

Background.

Lower socioeconomic position is generally associated with higher rates of smoking and alcohol consumption and lower levels of physical activity. Health-related behaviour is usually established during late childhood and adolescence. The aim of this study is to explore changes in health-related behaviour in a cohort of adolescents aged between 15 and 19, overall and by socioeconomic position.

Methods.

The sample consisted of 844 first-year students (42.8% males, baseline in 1998 – mean age 14.9, follow-up in 2002 – mean age 18.8) from 31 secondary schools located in Kosice, Slovakia. This study focuses on changes in adolescents' smoking, alcohol use, experience with marijuana and lack of physical exercise with regard to their socioeconomic position. Four indicators of socioeconomic position were used – adolescents' current education level and employment status, and the highest education level and highest occupational status of their parents. We first made cross tabulations of HRB with these four indicators, using McNemar's test to assess differences. Next, we used logistic regression to assess adjusted associations, using likelihood ratio tests to assess statistical significance.

Results.

Statistically significant increases were found in all health-related behaviours. Among males, the most obvious socioeconomic gradient was found in smoking, both at age 15 and at 19. Variations in socioeconomic differences in health-related behaviour were more apparent among females. Although at age 15, almost no socioeconomic differences in health-related behaviour were found, at age 19 differences were found for almost all socioeconomic indicators. Among males, only traditional socioeconomic gradients were found (the lower the socioeconomic position, the higher the prevalence of potentially harmful health-related behaviour), while among females reverse socioeconomic gradients were also found.

Conclusion.

We confirmed an increase in unhealthy health-related behaviour during adolescence. This increase was related to socioeconomic position, and was more apparent in females.

Background

Whereas adolescence is traditionally viewed as an age period of good somatic health, psychosocial health variables, e.g., psychosomatic health complaints or health-related behaviour (HRB), play a decisive role in determining adolescents' self-perceived health. Over the last thirty years a number of studies describing the relationships between socioeconomic position (SEP), health-related behaviour HRB and health have been performed (Glendinning et al. 1995; Rahkonen et al. 1995; Tuinstra et al. 1998; Piko and Fitzpatrick 2001; Sweeting and West 2001; Geckova et al. 2003). Undoubtedly HRB is a very important determinant of health as well as a contributor to socioeconomic inequalities in health (Glendinning et al. 1995; Huisman et al. 2003; Huisman et al. 2005).

Since adolescents' psychosocial health problems may have major implications for adult morbidity and mortality, investigating their correlates, such HRB deserves priority. With respect to HRB, adolescence is one of the most important periods of life. Adolescence is characterised by a strong tendency to experiment with risk behaviour. The desire for novelty and the courage for experiment are much greater in adolescence than in later life (Miles et al. 2001). Despite it being illegal, many young people have experience with drinking alcohol before turning 18, likewise with using drugs such as marijuana (Royo-Bordonada et al. 1997; Miles et al. 2001). Most adult smokers took up regular smoking in the period of adolescence (Tschann et al. 1994; Laaksonen et al. 1999). Even if most students are physically active at school, their compulsory school involvement often fails to translate itself into leisure time physical activity later (Kristjansdottir and Vilhjalmsson 2001; Aarnio et al. 2002). Moreover, the influence of peers and youth subcultures on HRB is statistically significant (Conrad et al. 1992; Boomsma et al. 1994). HRB established during this period tends to be maintained into adulthood (Pietila and Jarvelin 1995; Hemmingsson and Lundberg 2001; Gordon-Larsen et al. 2004). Due to the characteristics mentioned above, adolescence is also a very sensitive period for interventions and policies aimed at promoting health by focusing on risk behavior (Durlak and Wells 1997).

Previous research has consistently documented social class gradients in child and adult health (Hanson and Chen 2007). Low SEP adults are more likely to engage in risky health behaviours (Wardle et al. 2003).

Findings among adolescents are not so consistent. Previous research has shown a very strong traditional (consistent with adult behaviours) socio-economic gradients in insufficient physical activity of adolescents (Bergstrom et al. 1996; Karvonen and Rimpela 1996; Tuinstra et al. 1998; Kristjansdottir and Vilhjalmsson 2001; Huurre et al. 2003). Also regarding smoking by adolescents, mostly traditional socio-economic gradients were found (Green et al. 1991; Hanson and Chen 2007), though there are few studies which reporting no (Glendinning et al. 1992; Donato et al. 1995; Tuinstra et al. 1998), or a reversed socio-economic gradient (Huurre et al. 2003). On the other hand, no consistent socioeconomic differences in alcohol consumption have been confirmed among adolescents. The relationship between SEP and alcohol consumption is usually weak (Donato et al. 1995; Tuinstra et al. 1998; Huurre et al. 2003; Piko and Fitzpatrick 2007) or reversed (compared to adult socioeconomic gradients) (Green et al. 1991; Laaksonen et al. 2003). While binge drinking is associated with lower socioeconomic groups, some studies report that regular but moderate drinking is more common in higher socioeconomic groups (Williams and Debakey 1992; Romelsjo and Lundberg 1996). Similarly in marijuana

use among adolescents, mostly no (Tuinstra et al. 1998; Piko and Fitzpatrick 2007) or reversed socioeconomic (Piko and Fitzpatrick 2007) gradients have been reported among adolescents.

Furthermore, considerable gender differences can be found with relation to health-related behaviour, both in adults and in adolescents. Generally, males exhibit more health-risk and less health-protective behaviour than females (Stock et al. 2001; Steptoe et al. 2002). However, in recent years some studies have reported a remarkable increase in smoking among women (Rahkonen et al. 1992; Stock et al. 2001; Steptoe et al. 2002). A sedentary lifestyle is also more common for women (Vilhjalmsson and Thorlindsson 1998; Caspersen et al. 2000; van Mechelen et al. 2000; Aarnio et al. 2002).

Several studies have shown differences by gender in socioeconomic gradients in HRB. In a sample of Australian adolescents, Scragg et. al.(2002) found a negative association between SEP and smoking only among females; the lower was the SEP the higher was the smoking occurrence. Nevertheless, the majority of the studies focusing on gender differences for socioeconomic gradients in smoking found no difference (Hanson and Chen 2007). We have also found no study showing gender differences in the socioeconomic gradient of alcohol and marijuana consumption among adolescents. On the other hand, several adolescent studies report that they only found associations between physical activity and SEP for females (Utter et al. 2003; Wardle et al. 2003; Fahlman et al. 2006). However, the majority of the studies found no significant differences in the association between SEP and physical activity between boys and girls (Hanson and Chen 2007).

Several studies have also gender differences in the relationship between health behaviours and adolescents' self-perceived health. A recently published study on a representative sample of Hungarian adolescents aged 14 to 19 suggests that among boys drug use and the lack of physical activity are significant predictors of self-perceived health, but not among girls. Among girls, smoking may act in a similar way (Piko 2007). Gender differences in health perceptions are often reported. This is probably because women, in contrast to men, consider a broader set of factors when making general ratings of health, e.g., psychological factors and minor subjective health complaints (Benyamini et al. 2000).

It should be noted that there may be shortcomings in the use of parental SEP markers as measures of social status during adolescence (Emerson et al. 2006). Traditionally, adolescent studies assess the SEP of the parents (e.g., parental education, parental occupation, family income) as indicators of SEP. As adolescents spend less time at home and experience transition into the independence of adulthood, parental SEP markers may not be accurate indicators of adolescents' social status (Hanson and Chen 2007). It is possible that, during adolescence, HRB is more strongly influenced by peer social status (i.e. the social standing of an adolescent within his/her school), as opposed to family social status. An adolescent's family social status is an assigned status and its impact may be too distant, as teens gain independence, to impact their health behaviour choices (West and Sweeting 2004). Status among their peers, however, is an earned status, and may better capture the experience of placement within a social hierarchy during adolescence (Goodman et al. 2001).

Most of these studies of socioeconomic differences in HRB in adolescents, however, were cross-sectionally designed. The use of a longitudinal design may be highly significant in exploring changes in HRB, particularly in adolescents. The aim of this study was to analyze the changes in HRB in relation to SEP in a cohort of Slovak

adolescents aged between 15 and 19. Our attention is accordingly focused on the following research questions. Did the HRB of adolescents change between the ages 15 and 19? Were the changes in HRB during adolescence related to SEP? If yes, which socioeconomic indicators showed the steepest graduation in HRB?

Table 1. Gender, age and socioeconomic position characteristics

	Measurement point			
	T1 participants % (N)	T2 drop-out% (N)	T2 participants % (N)	Cohen's w^2
Total	100 (1850)	100 (1006)	100 (844)	
Gender				
Males	48.6 (899)	53.5 (583)	42.8 (361)	0.107
Females	51.4 (951)	46.5 (468)	57.2 (483)	
Age				
Mean (SD)	14.9 (0.62)	18.8 (0.55)	18.8 (0.55)	
Respondents' education level				
Grammar	23.8 (440)	19.1 (193)	29.3 (247)	
Specialised secondary	43.4 (802)	41.7 (420)	45.3 (382)	0.224
Apprentice	32.7 (608)	39.1 (393)	25.5 (215)	
Current employment status				
Student	n.a.	n.a.	66.3 (558)	
Employed	n.a.	n.a.	12.6 (106)	n.a.
Unemployed	n.a.	n.a.	21.1 (178)	
Parents' highest occupational level				
High	29.8 (538)	29.0 (283)	30.8 (255)	
Medium	36.2 (653)	34.8 (339)	37.9 (314)	0.052
Low	33.9 (612)	36.2 (353)	31.3 (259)	
Parents' highest education level				
High	26.0 (477)	25.7 (255)	26.4 (222)	
Medium	49.7 (910)	48.3 (479)	51.2 (431)	0.042
Low	24.3 (445)	25.9 (257)	22.4 (188)	

1 Due to rounding, not all percentages add up to 100%
2 Cohen's w is a measure of the strength of the effect of a characteristic on the outcome. It is independent from sample size, and is expressed as effect size (ES). It could be interpreted as follows: if w < 0.1 the effect is trivial, if w ranges from 0.1 to 0.3 the effect is small, if w ranges from 0.3 to 0.5 the effect is moderate and if w > 0.5 the effect is large.
3 ES - Effect size,
n.a. – not available
T1 – baseline measurement
T2 – follow up

Methods

Sample

The data used in this study were derived from a longitudinal study of socioeconomic inequalities in health (Geckova et al. 2002). Data for the baseline study (T1) were collected in autumn 1998. The sample consisted of 1850 first-year students from 31 secondary schools located in Kosice, Slovakia. Individual schools and classes were selected randomly after stratification by gender and secondary school type (grammar schools, specialised secondary schools and apprentice schools). The aim of the stratification was to get a similar number of boys and girls and to maintain the proportion of secondary school types similar to the relative share of school types as the overall the national level.

The mean age of the participants at baseline was 14.9, compared to 18.8 at follow up. At baseline respondents completed the questionnaire in their classrooms at school under the guidance of field workers; the response rate was 96.3% (Geckova et al. 2002). The follow up (T2) took place during December 2002. Respondents received self-administered postal questionnaires along with a stamped return envelope. One reminder was sent to those who did not reply. We received 844 usable questionnaires, representing a response rate of 45.5%. Females were over-represented in the response group as compared with the non-response group. In the response group more grammar students and fewer apprentice students enrolled in the second wave of the study. The potential effect of selective loss to follow-up was assessed by computing Cohen's W effect size for differences in socioeconomic position by response status (Chen et al. 2010; Cohen et al. 2010). All differences were trivial or small (Cohen's W ranging from 0.042 to 0.224), but they were largest for the educational level of the respondents (Table 1). Also differences in HRB in the response group as compared with the non-response at the time of the baseline study were assessed. The differences were trivial in size (Cohen's W ranging from 0.005 to 0.098; Table 2). The potential effect of selective loss according to SEP of respondents is small and according to their HRB even smaller.

Indicators of socioeconomic position (SEP)

Four indicators of the adolescents' SEP were used – their current education level and employment status, and the highest education level and highest occupational status of their parents. The respondents' employment status was assessed at follow up; the other socioeconomic indicators were assessed at baseline. The respondents' education level was defined as the highest level of education attained. It was classified as – I. Grammar school, II. Specialised secondary school, and III. Apprenticeship or elementary school only. The respondents' current employment status was classified as – I. Student, II. Employed and III. Unemployed. The parents' education level was based on the parent with the highest level of education attained. It was classified as – I. University, II. Secondary school and III. Apprenticeship or primary school only.

The parents' occupational status was based on the parent with the highest occupational status, defined as the parent's current or previous occupation if not currently employed. The occupation was derived by coding job descriptions according to the ISCO88 classifications (International Standard Classification of Occupations). Ten

ISCO88 categories were clustered in three groups. High SEP – I. Legislators, II. Senior officials and managers; Medium SEP – III. Technicians and associate professionals, IV. Clerks, and 0. Armed forces (As the professional part of the army consisted mostly of technicians, clerks or managers, we decided to classify the armed forces into the Medium SEP group); Low SEP – V. Service workers and shop and market sales workers, VI. Skilled agricultural and fishery workers, VII. Craftsmen and related trade workers, VIII. Plant and machine operators and assemblers, and IX. Elementary occupations.

Table 2. Health-related behaviour at T1, comparison of participants and drop-outs at T2

		Measurement point			
		T1 participants %(N)	T2 drop-out %(N)	T2 participants %(N)	Cohen's w^2
Males	Smoking	23.9 (214)	26.1 (140)	20.6 (74)	0.064
	Alcohol	12.8 (115)	12.7 (68)	13.0 (47)	0.005
	Marijuana	7.3 (65)	9.3 (50)	4.2 (15)	0.098
	No sport	9.1 (81)	7.1 (38)	12.2 (44)	0.087
Females	Smoking	18.2(173)	18.6 (87)	17.8 (86)	0.010
	Alcohol	8.3(79)	7.9 (37)	8.7 (42)	0.014
	Marijuana	5.8 (27)	5.2 (25)	5.5 (52)	0.013
	No sport	26.9 (126)	26.5 (128)	26.7 (254)	0.005

1 Cohen's w is a measure of the strength of the effect of a characteristic on the outcome. It is independent from sample size, and is expressed as effect size (ES). It could be interpreted as follows: if w < 0.1 the effect is trivial, if w ranges from 0.1 to 0.3 the effect is small, if w ranges from 0.3 to 0.5 the effect is moderate and if w > 0.5 the effect is large.

T1 – baseline measurement

T2 – follow up

Measures of health-risk behaviour

This study focuses on four types of health-related behaviour – smoking, alcohol use, experience with marijuana and lack of physical exercise. For each, a dichotomised variable was constructed. The main goal of this dichotomization was to analyse possible social inequalities in relation with the presence or absence of the health related behaviours in question. In general, we adhered to cut-offs that had been used in previous studies (Tuinstra et al. 1998; Geckova et al. 2002; Sleskova et al. 2005).

Regarding smoking habits, respondents were asked: 'Have you ever smoked a cigarette?' Four possible answers were available – 1) I have never smoked, 2) Yes, I have tried, 3) Sometimes I smoke but not daily, and 4) I smoke daily now. Subjects who smoked sometimes or daily were classified as smokers, the rest as non-smokers.

Regarding alcohol consumption, respondents were asked a question concerning their frequency of alcohol consumption over the previous four weeks. Individuals were classified as alcohol consumers if they reported consumption three times or more over the preceding four weeks.

Experience with marijuana was assessed by the question: 'Have you ever used marijuana or hash?' Respondents who answered yes were classified as marijuana users, the rest of the respondents as non-users.

Sufficient physical activity was assessed by the question: 'How often do you do sport?' There were four possible answers – 1) daily, 2) 2 to 3 times a week, 3) once a week and 4) I do no sport. Only sporting activities lasting longer than 20 minutes were considered and physical education at school was omitted. Respondents were sorted into two groups according to their answers – 1) insufficient physical activity, made up of respondents doing sport once or less a week, and 2) sufficient physical activity, made up of respondents doing sport twice or more a week.

Statistical analysis

Changes in HRB between the ages of 15 and 19 by SEP category were analyzed using the nonparametric McNemar test for two related dichotomous variables; analyses were stratified by gender and also by type of secondary school.

Formal testing of the interaction of changes in health-related behaviour for gender by SEP was performed. Results showed a statistically significant interaction ($p < 0.05$) in marijuana use for gender by all socio-economic indicators. We also found statistically significant interactions with gender ($p < 0.05$) of alcohol consumption and of smoking for all socio-economic indicators except for the respondents' current employment status. With regard to physical activity, statistically significant interactions ($p < 0.05$) with gender were found for the parents' education level and for the parents' occupational level. Because of this, we present all results for males and females to support comparisons of socioeconomic gradients across various HRBs.

Changes in HRB gradients with regard to SEP were analyzed using logistic regression. For each type of HRB, three regression models were explored – Model 1 to examine the effect of SEP on HRB at T1; Model 2 to examine the effect of SEP on HRB at T2; and Model 3 to examine the potential differences in changes in socioeconomic gradients in HRB between 15 and 19 by analyzing the effect of SEP on HRB at T2 controlled for HRB at T1. The procedure was repeated for all four socioeconomic indicators used.

All analyses were carried out separately for males and females. The analyses were all done using the statistical software package SPSS version 10.1. Using MlWin 2.02, (Rasbash et al. 2005) we found no indications for a clustering by school at the baseline measurement for the outcomes at the follow-up.

Results

Changes in HRB between age 15 (T1) and 19 (T2)

As the results of the McNemar tests show, alcohol consumption, experience with marijuana and insufficient physical activity in males at T2 compared to T1 statistically significantly increased for each category of each socioeconomic indicator. The same applies to smoking behaviour, with the exception of males at the lowest education level, unemployed males and males with parents at the lowest education level who did not report statistically significant worsening in smoking behaviour (Table 3).

Among females, a statistically significant increase in smoking, experience with marijuana and insufficient physical activity was reported for each category of each socioeconomic indicator. The same applies to alcohol consumption with the exception of females at the lowest education level, unemployed females and females with parents in the lowest educational and occupational levels who did not report statistically significant increases in alcohol consumption (Table 4).

Types of socioeconomic gradients reported

Two types of socioeconomic gradients were found. The first type was the "traditional" (consistent with adult literature) socioeconomic gradient, characterised by a decreasing prevalence of unhealthy behaviour associated with increasing SEP. This means the higher the respondent's SEP the lower the level of unhealthy behaviour. The second was a "reversed" socioeconomic gradient characterised by an increasing prevalence of unhealthy behaviour with increasing SEP. This means the higher the respondent's SEP the higher the level of unhealthy behaviour.

Changes in socioeconomic gradients in smoking

The results of the logistic regression indicate that the SEP of males is a statistically significant predictor of smoking behaviour at T1 and at T2. Clear traditional socioeconomic gradients in smoking at T1, less smoking associated with higher SEP, were found for all four socioeconomic indicators used. Similarly, statistically significant social gradients were found at T2 according to the education levels of respondents, their current employment status and the highest education level of their parents. The statistically significant effect of SEP on smoking behaviour at T2 disappeared when controlled for smoking behaviour at T1 (Table 3).

A less clear picture was found of changes in the smoking habits of females. A traditional gradient in smoking among females according to current employment status was found for both measurement points. The gradient at T2 remained statistically significant even after being controlled for smoking behaviour at T1. However, a statistically significant reversed gradient in smoking according to the highest education level of the parents was found at T2. Moreover, this gradient at T2 remained statistically significant even after being controlled for smoking behaviour at T1 (Table 4).

Changes in socioeconomic gradients in alcohol consumption

No socioeconomic differences in alcohol consumption among males were found at T1 or at T2 (Table 3). On the other hand, among females, reversed socioeconomic gradients were again found – at T1 according to the highest occupational level of the parents and at T2 according to the respondents' education level and the highest educational and occupational levels of the parents. After controlling gradients at T2 for alcohol consumption at T1, the gradients according to the respondents' education level and highest education level of their parents remained statistically significant, while the gradient according to highest occupational level of the parents became statistically insignificant (Table 4).

Table 3 Socioeconomic gradients in health-risk behaviour of males

		T1%	T2%	Sig.1	model 1 OR	95 % CI	p	model 2 OR	95 % CI	p	model 3 OR	95 % CI	p
Smoking													
Respondents' education level	Grammar	3.0	23.8	0.000	1		[2]	1		[2]	1		
	Specialised	18.3	36.4	0.000	7.32	(2.16-24.7)		1.85	(1.04-3.20)		1.27	(0.69-2.31)	
	Apprentice	40.6	50.0	0.064	22.30	(6.63-74.9)		3.21	(1.77-5.82)		1.34	(0.68-2.66)	
Current employment status	*Student*	13.7	31.1	0.000	1		[2]	1		[2]	1		
	Employed	31.3	59.4	0.004	2.87	(1.26-6.55)		3.23	(1.53-6.88)		2.65	(1.15-6.13)	
	Unemployed	43.8	50.0	0.481	4.90	(2.66-8.99)		2.21	(1.27-3.87)		1.11	(0.56-2.18)	
Parents' highest education level	*High*	12.4	28.9	0.001	1		[2]	1		[2]	1		
	Medium	23.0	39.0	0.000	1.84	(0.93-3.64)		1.78	(1.04-2.98)		1.57	(0.87-2.82)	
	Low	24.7	41.2	0.064	2.77	(1.28-5.98)		1.84	(0.96-3.49)		1.30	(0.63-2.71)	
Parents' highest occupational level	*High*	12.7	27.5	0.000	1		[2]	1			1		
	Medium	21.2	40.0	0.000	2.11	(1.07-4.13)		1.59	(0.93-2.65)		1.27	(0.71-2.29)	
	Low	28.8	41.1	0.003	2.32	(1.14-4.73)		1.72	(0.98-3.03)		1.34	(0.71-2.54)	
Alcohol consumption													
Respondents' education level	*Grammar*	11.9	26.7	0.000	1			1			1		
	Specialised	14.3	33.8	0.000	1.24	(0.58-2.63)		1.40	(0.80-2.43)		1.37	(0.78-2.41)	
	Apprentice	12.3	37.7	0.000	1.04	(0.44-2.39)		1.66	(0.92-3.00)		1.68	(0.51-5.58)	
Current employment status	*Student*	12.9	29.9	0.000	1			1			1		
	Employed	6.3	46.9	0.000	0.45	(0.10-1.97)		2.07	(0.98-4.34)		2.25	(0.99-4.77)	
	Unemployed	17.2	39.1	0.000	1.40	(0.67-2.95)		1.50	(0.85-2.65)		1.45	(0.82-2.58)	
Parents highest education level	*High*	9.9	32.2	0.000	1			1			1		
	Medium	16.2	31.6	0.000	1.77	(0.80-3.92)		1.00	(0.60-1.68)		0.94	(0.56-1.59)	
	Low	9.3	34.0	0.004	1.83	(0.72-4.68)		1.09	(0.58-2.06)		1.02	(0.53-1.95)	
Parents highest occupational level	*High*	8.8	32.4	0.000	1			1			1		
	Medium	14.6	32.4	0.002	1.75	(0.82-3.71)		0.97	(0.58-1.64)		0.90	(0.53-1.54)	
	Low	15.1	34.2	0.000	0.93	(0.37-2.31)		1.08	(0.62-1.91)		1.09	(0.62-1.94)	

1) McNemar test
2) text in bold indicate that overall a variable contributes to the logistic model at p<0.05
Model 1 effect of SEP on HRB at T1; Model 2 effect of SEP on HRB at T2; Model 3 effect of SEP on HRB at T2 controlled for HRB at T1
OR – odds ratio

Table 3 Socioeconomic gradients in health-risk behaviour of males

		T1%	T2%	Sig.1	model 1 OR	95 % CI	p	model 2 OR	95 % CI	p	model 3 OR	95 % CI	p
Marijuana use													
Respondents' education level	Grammar	1.0	25.7	0.009	1		[2]	1		[2]	1		
	Specialised	2.6	39.6	0.000	2.67	(0.29-24.2)		1.89	(1.09-3.28)		1.84	(1.05-3.22)	
	Apprentice	9.4	42.9	0.000	10.42	(1.31-82.9)		2.16	(1.20-3.90)		1.79	(0.97-3.29)	
Current employment status	*Student*	3.8	33.0	0.000	1			1		[2]	1		
	Employed	3.1	43.8	0.000	0.82	(0.99-4.77)		1.58	(0.75-3.33)		1.65	(0.77-3.52)	
	Unemployed	6.3	49.2	0.000	1.69	(0.51-5.58)		1.97	(1.13-3.44)		1.93	(1.00-3.43)	
Parents highest education level	*High*	2.5	30.6	0.000	1			1			1		
	Medium	5.1	41.2	0.000	2.86	(0.61-13.3)		1.53	(0.91-2.55)		1.42	(0.84-2.41)	
	Low	3.1	35.4	0.000	1.41	(0.19-10.2)		1.30	(0.68-2.45)		1.28	(0.66-2.45)	
Parents highest occupational level	*High*	2.0	30.4	0.000	1			1			1		
	Medium	5.4	40.0	0.000	2.13	(0.54-8.44)		1.59	(0.95-2.66)		1.52	(0.89-2.58)	
	Low	2.7	36.1	0.000	1.26	(0.25-6.36)		1.25	(0.70-2.20)		1.24	(0.69-2.21)	
Insufficient physical activity													
Respondents' education level	*Grammar*	5.0	21.8	0.001	1		[2]	1			1		
	Specialised	15.6	31.2	0.000	3.55	(1.31-9.63)		1.63	(0.91-2.91)		1.39	(0.76-2.53)	
	Apprentice	14.2	29.5	0.006	3.17	(1.11-9.06)		1.50	(0.80-2.83)		1.31	(0.68-2.50)	
Current employment status	*Student*	11.4	27.0	0.000	1			1			1		
	Employed	15.6	34.4	0.046	1.44	(0.52-4.03)		1.42	(0.65-3.09)		1.35	(0.60-3.02)	
	Unemployed	14.1	29.7	0.031	1.28	(0.57-2.84)		1.14	(0.63-2.08)		1.10	(0.59-2.05)	
Parents' highest education level	*High*	9.9	27.3	0.002	1			1			1		
	Medium	14.0	30.9	0.000	1.06	(0.49-2.30)		1.18	(0.69-2.04)		1.18	(0.68-2.06)	
	Low	11.3	22.9	0.006	1.47	(0.60-3.60)		0.91	(0.46-1.81)		0.84	(0.41-1.71)	
Parents' highest occupational level	*High*	10.8	26.5	0.000	1			1			1		
	Medium	11.4	29.9	0.000	1.48	(0.68-3.18)		1.19	(0.69-2.05)		1.13	(0.65-1.96)	
	Low	15.1	24.7	0.021	1.16	(0.49-2.76)		0.79	(0.43-1.47)		0.76	(0.40-1.45)	

1) McNemar test
2) text in bold indicate that overall a variable contributes to the logistic model at p<0.05
Model 1 effect of SEP on HRB at T1; Model 2 effect of SEP on HRB at T2; Model 3 effect of SEP on HRB at T2 controlled for HRB at T1
OR – odds ratio

Table 4 Socioeconomic gradients in health-risk behaviour of females

		T1%	T2%	Sig.1	model 1 OR	95 % CI	p	model 2 OR	95 % CI	p	model 3 OR	95 % CI	p
Smoking													
Respondents' education level	Grammar	14.4	38.4	0.000	1			1			1		
	Specialised	17.5	40.5	0.000	1.27	(0.71-2.25)		1.10	(0.71-1.68)		1.04	(0.66-1.63)	
	Apprentice	22.9	45.9	0.000	1.77	(0.93-3.37)		1.36	(0.82-2.25)		1.19	(0.70-2.03)	
Current employment status	*Student*	14.3	35.4	0.000	1		[2]	1		[2]	1		[2]
	Employed	18.9	50.7	0.000	1.40	(0.72-2.73)		1.88	(1.19-3.15)		1.84	(1.06-3.17)	
	Unemployed	26.3	50.0	0.000	2.14	(1.26-3.64)		1.83	(1.18-2.83)		1.55	(0.97-2.48)	
Parents' highest education level	*High*	20.1	48.1	0.000	1			1		[2]	1		[2]
	Medium	17.4	38.8	0.000	1.03	(0.58-1.80)		0.65	(0.42-1.01)		0.61	(0.38-0.98)	
	Low	16.7	37.0	0.000	0.77	(0.39-1.54)		0.59	(0.34-0.99)		0.59	(0.34-1.03)	
Parents' highest occupational level	*High*	18.3	49.6	0.000	1			1			1		
	Medium	18.7	39.0	0.000	0.84	(0.47-1.48)		0.68	(0.43-1.08)		0.69	(0.42-1.12)	
	Low	14.8	36.5	0.000	0.79	(0.44-1.43)		0.63	(0.40-1.01)		0.64	(0.39-1.06)	
Alcohol consumption													
Respondents' education level	*Grammar*	9.6	24.7	0.001	1			1		[2]	1		[2]
	Specialised	9.2	18.9	0.002	0.96	(0.47-1.95)		0.71	(0.43-1.17)		0.72	(0.43-1.19)	
	Apprentice	6.4	11.0	0.332	0.65	(0.25-1.66)		0.38	(0.19-0.77)		0.39	(0.19-0.78)	
Current employment status	*Student*	10.2	19.1	0.002	1			1			1		
	Employed	2.7	21.6	0.001	0.24	(0.06-1.05)		1.17	(0.63-2.18)		1.24	(0.66-2.32)	
	Unemployed	8.8	16.7	0.078	0.85	(0.40-1.79)		0.85	(0.48-1.50)		0.85	(0.48-1.52)	
Parents highest education level	*High*	14.9	25.4	0.021	1			1	2		1		[2]
	Medium	5.6	19.2	0.001	0.48	(0.23-0.97)		0.59	(0.35-0.99)		0.61	(0.36-1.03)	
	Low	7.4	13.6	0.096	0.39	(0.16-1.01)		0.41	(0.21-0.81)		0.43	(0.22-0.85)	
Parents highest occupational level	*High*	14.2	26.7	0.040	1		[2]	1		[2]	1		
	Medium	7.3	17.6	0.000	0.34	(0.15-0.75)		0.70	(0.41-1.20)		0.74	(0.43-1.28)	
	Low	6.1	13.0	0.089	0.46	(0.21-0.97)		0.46	(0.25-0.84)		0.48	(0.27-0.88)	

1) McNemar test
2) text in bold indicate that overall a variable contributes to the logistic model at p<0.05
Model 1 effect of SEP on HRB at T1; Model 2 effect of SEP on HRB at T2; Model 3 effect of SEP on HRB at T2 controlled for HRB at T1
OR – odds ratio

Table 4 Socioeconomic gradients in health-risk behaviour of females

		T1%	T2%	Sig.1	model 1 OR	95 % CI	p	model 2 OR	95 % CI	p	model 3 OR	95 % CI	p
Marijuana use													
Respondents' education level	*Grammar*	4.8	32.2	0.000	1			1			1		
	Specialised	4.8	28.2	0.000	1.01	(0.38-2.66)		0.83	(0.53-1.30)		0.82	(0.51-1.30)	
	Apprentice	6.5	22.0	0.000	1.38	(0.47-4.04)		0.60	(0.34-1.05)		0.55	(0.30-1.04)	
Current employment status	*Student*	5.1	29.3	0.000	1			1			1		
	Employed	1.4	27.4	0.000	0.26	(0.33-1.96)		0.91	(0.52-1.62)		1.00	(0.56-1.79)	
	Unemployed	8.0	25.4	0.000	1.61	(0.68-3.79)		0.84	(0.51-1.35)		0.76	(0.45-1.27)	
Parents' highest education level	*High*	6.7	38.1	0.000	1			1		[2]	1		[2]
	Medium	5.1	24.2	0.000	0.76	(0.29-2.00)		0.51	(0.32-0.81)		0.50	(0.31-0.81)	
	Low	4.3	23.6	0.000	1.06	(0.36-3.11)		0.42	(0.24-0.74)		0.39	(0.21-0.71)	
Parents' highest occupational level	*High*	5.8	40.0	0.000	1			1		[2]	1		[2]
	Medium	4.5	25.3	0.000	0.74	(0.29-1.92)		0.52	(0.32-0.85)		0.52	(0.31-0.86)	
	Low	6.1	21.7	0.000	0.63	(0.23-1.73)		0.50	(0.30-0.83)		0.51	(0.30-0.86)	
Insufficient physical activity													
Respondents' education level	*Grammar*	25.3	36.3	0.038	1			1		[2]	1		[2]
	Specialised	23.7	42.1	0.000	0.91	(0.57-1.48)		1.28	(0.83-1.96)		1.32	(0.85-2.05)	
	Apprentice	33.9	56.0	0.001	1.51	(0.88-2.61)		2.23	(1.34-3.70)		2.13	(1.26-3.58)	
Current employment status	*Student*	23.8	38.8	0.000	1			1			1		
	Employed	28.4	50.0	0.006	1.27	(0.72-2.25)		1.58	(0.95-2.64)	[2]	1.54	(0.91-2.61)	
	Unemployed	31.6	51.8	0.001	1.48	(0.92-2.38)		1.69	(1.10-2.62)		1.60	(1.02-2.51)	
Parents highest education level	*High*	24.6	36.6	0.067	1			1		[2]	1		[2]
	Medium	30.9	43.8	0.000	1.18	(0.71-1.94)		1.51	(0.96-2.37)		1.49	(0.93-2.38)	
	Low	22.8	50.0	0.000	1.11	(0.61-2.00)		2.10	(1.24-3.56)		2.15	(1.25-4.71)	
Parents highest occupational level	*High*	24.2	34.2	0.021	1			1		[2]	1		[2]
	Medium	27.2	43.9	0.008	1.37	(0.83-2.27)		1.35	(0.85-2.43)		1.28	(0.80-2.06)	
	Low	26.1	52.2	0.000	0.91	(0.53-1.55)		1.74	(1.09-2.77)		1.83	(1.13-2.97)	

1) McNemar test
2) text in bold indicate that overall a variable contributes to the logistic model at p<0.05
Model 1 effect of SEP on HRB at T1; Model 2 effect of SEP on HRB at T2; Model 3 effect of SEP on HRB at T2 controlled for HRB at T1
OR – odds ratio

Changes in socioeconomic gradients in experience with marijuana

A traditional gradient according to the respondents' education level in experience with marijuana was found among males at both times of measurement. A traditional gradient according to the respondents' current employment status was also found but only at T2. After controlling for experience with marijuana at T1, gradients at T2 became statistically insignificant (Table 3).

Again, a different picture was found for females. No socioeconomic differences in the experience with marijuana were found in relation to the respondents' employment status and also to their education level at both measurement points. On the other hand, clear reversed gradients according to the highest educational and occupational levels of the parents were found. These remained stable even after controlling for experience with marijuana at T1 (Table 4).

Changes in socioeconomic gradients in insufficient physical activity

Regarding the insufficient physical activity of males at T1, only a traditional socioeconomic gradient according to the respondents' education level was found. No statistically significant socioeconomic differences among males were found at T2 (Table 3).

On the other hand, obvious socioeconomic gradients regarding changes in insufficient physical activity were found for females. Since at T1 no socioeconomic gradients according any of the socioeconomic indicators used were found, at T2, clear traditional socioeconomic gradients were found for every socioeconomic indicator used. socioeconomic gradients according to the respondents' education level and the highest educational and occupational levels of their parents remained statistically significant even after being controlled for insufficient physical activity at T1 (Table 4).

Table 5 Differences in changes of HRB in the period between T1 and T2 according to gender (results of logistic regression

			Crude			Adjusted for HRB at T1		
	T1(%)	T2(%)	OR	95% CI	p	OR	95% CI	p
Smoking								
Males	20.6	36.8	1			1		
Females	17.8	41.1	1.20	(0.90, 1.20)	0.213	1.32	(0.97, 1.80)	0.078
Alcohol								
Males	13.0	33.0	1			1		
Females	8.7	18.9	0.47	(0.34, 0.47)	0.000	0.49	(0.36, 0.67)	0.000
Marijuana								
Males	4.2	36.7	1			1		
Females	5.2	28.0	0.40	(0.28, 0.40)	0.000	0.64	(0.47, 0.87)	0.004
No sport								
Males	12.2	18.1	1			1		
Females	26.5	43.5	0.67	(0.50, 0.67)	0.008	1.70	(1.25, 2.30)	0.001

OR – odds ratio; T1 – baseline measurement;T2 – follow up measurement ; 95% CI – confidence interval

Gender differences

The relative increase in the occurrence of risky behaviour in alcohol consumption, experience with marijuana and insufficient physical activity between T1 and T2 was greater in males than in females. These gender differences were statistically significant (Table 5). No gender differences were found in the change in smoking behaviour.

Discussion

This study describes changes in HRB according to SEP in a cohort of Slovak young adults aged between 15 and 19. Between these ages a greater increase in alcohol consumption and experience with marijuana was found for males than in females. However, the increase in insufficient physical activity was greater for females. Since there was already a clear gender difference at the study baseline, the gap between the genders in relation to these HRBs became wider. The finding that more males drank alcohol and used marijuana was unsurprising as similar outputs had been published in earlier studies (Burke et al. 1997; Telama and Yang 2000; van Mechelen et al. 2000; Aarnio et al. 2002; Courtenay et al. 2002; Harrell et al. 2003). A sedentary lifestyle is more common among females than in males in late adolescence and young adulthood (Telama and Yang 2000; van Mechelen et al. 2000; Aarnio et al. 2002; Harrell et al. 2003). High consumption of alcohol is likely to be linked to the young males' lifestyle, associated with a normative peer pressure to drink (Stock et al. 2001). The reasons for marijuana use among men may be similar to those for alcohol, and peer attitudes play an important role in explaining this (Lo and Globetti 1995).

Studies performed over the last few decades present a well-documented equalisation trend in the smoking behaviour of males and females. This has resulted in an increasing number of smoking females in the community (Rahkonen et al. 1992; Stock et al. 2001), while the proportion of smoking males is decreasing (Rahkonen et al. 1992) or remaining stable (Laaksonen et al. 1999).

As no socioeconomic differences in changes in the HRB studied were found among males, the socioeconomic gradients in HRB described at T1 were similar to those at T2 for males. The number of smokers was highest in the lowest socioeconomic groups for all socioeconomic indicators. A similar outcome was obtained when using marijuana and insufficient sporting activity among males, but not for every socioeconomic indicator. No socioeconomic gradient was found for alcohol consumption by males. These findings are consistent with the results of previous studies (Knupfer 1989; Williams and Debakey 1992; Osler et al. 2001).

Results on experience with marijuana are somewhat difficult to understand. While in relation to women's educational level and to their employment status no socioeconomic gradient was found, in relation to their parental educational and occupational level a reversed gradient was discovered. On the other hand, among men traditional gradients were found in relation to their education level and to their employment status, and no gradients in relation to parental socioeconomic indicators. However, this ambiguous result fits with those of previous studies on the association of SEP and marijuana experience during adolescence. According to the current literature review by Hanson and Chen (2007), these studies also found varying associations. The most frequently reported finding was of no socioeconomic gradients, while some reported traditional socioeconomic gradients: higher SEP

associated with less use; and some reported reversed socioeconomic gradients: the higher the SEP, the greater the use. The character of the socioeconomic gradients was usually determined by the type of socioeconomic indicator used. The findings of previous studies suggest that the relationship between the social status of parents (e.g. educational or occupational status) as socioeconomic indicators and marijuana use is more likely to show no (Olsson et al. 2003; Piko and Fitzpatrick 2007) or a traditional association, (Miller and Miller 1997; Wichstrom and Pedersen 2001) whereas the relationship between financial resources (Chen and Killeya-Jones 2006) or self-assessed SEP (Piko and Fitzpatrick 2007) as indicators and marijuana use is more likely to be reversed. However, there are studies with results not fully consistent with these findings (Hanson and Chen 2007).

According to Luthar and Latendresse (2005), high-SEP adolescents engage in negative health behaviours in order to combat the stress, anxiety, and depression they experience from achievement pressures. It is possible that this type of pressure could be common in relation to highly-educated parents with a less academically successful child. In combination with more available money and negative peer influence, the group having parents with high social status could become more susceptible to negative health-related behaviour. These explanations require more attention in future.

Using SEP based on the parents' characteristics yielded an inconsistent or reversed pattern of socioeconomic differences in smoking among females, while using SEP based on the adolescents themselves – their current position – yielded socioeconomic differences in smoking unfavourable for females of lower SEP. An explanation may be that measuring SEP using the parents' characteristics loses validity in adolescence (West 1988; Piko and Fitzpatrick 2001). On the other hand, using the socioeconomic characteristics of adolescents is also problematic (Rahkonen et al. 1995). Methodological problems related to measuring SEP may be a source of inconsistency in findings related to socioeconomic differences in HRB. Glendinning et al. (1994), with the aim of measuring SEP based on respondents' instead of their parents' characteristics, used young adults' economic activity. It is suggested that subjects who continue to study will differ as regards SEP from those who enter the labour market and succeed (employed) or fail (unemployed). Hanson and Chen (2007) conclude in a current literature review of socioeconomic position and health related behaviour in adolescence that future studies should employ alternative measures of SEP, such as an adolescent's perception of social status relative to others in their peer group, due to recent findings which suggest that such measures may be a better predictor of adolescent health than the traditional objective measures. By employing alternative measures of social status, future studies may be able to further clarify the socioeconomic patterns for adolescent health behaviours.

Findings related to socioeconomic differences in HRB may depend on the way HRB is measured. Sweeting and West explored socioeconomic differences in smoking among adolescents with respect to the definition of smokers. The stricter the definition of smoking, the clearer the socioeconomic gradients in smoking that were found. Moreover, reversed relationships between SEP and HRB were found when occasional smoking was explored (Sweeting and West 2001). Our definition of smokers includes both daily and occasional smokers. We therefore repeated post-hoc our analyses for daily smokers. The character of socioeconomic gradients in smoking among males remained stable. On the other hand, results for females were more in line with findings of Sweeting and West; the traditional gradients previously found

according to their employment status and according to their education level became steeper and the reversed socioeconomic gradient previously found according to their parents' educational level was no more statistically significant.

Changes in alcohol consumption in females were mostly related to the education levels of their parents and the respondents' own education levels. Females with higher SEP reported greater increase in alcohol consumption compared to females with lower SEP. Moderate drinking may be part of a high SEP lifestyle geared towards pleasure and comfort (Knupfer 1989; Williams and Debakey 1992; Romelsjo and Lundberg 1996; Osler et al. 2001).

No statistically significant socioeconomic differences among males were found at T2. On the other hand, obvious socioeconomic gradients regarding insufficient physical activity were found for females at T2. This is consistent with the results of several previous studies (Utter et al. 2003; Wardle et al. 2003; Fahlman et al. 2006). Female respondents' school type and the education level of their parents appeared to be statistically significant predictors of physical inactivity. The largest increase in insufficient physical activity was observed among females with low education and with low-educated parents. Females may be more likely to exercise if they are enrolled in a formal activity, such as a dance class or swimming lessons (Vilhjalmsson and Kristjansdottir 2003). Even though lower education is usually associated with lower income, the inaccessibility of sports facilities due to high costs could explain this effect only partially. Overall, these findings suggest that higher family social status or prestige may be a stronger influence on physical activity than financial resources in high SEP adolescents (Hanson and Chen 2007). The explanation for this relationship is more likely to be a kind of normative behaviour towards damaging behaviours (Uitenbroek et al. 1996) and better ability to make informed choices (Kristjansdottir and Vilhjalmsson 2001; Vilhjalmsson and Kristjansdottir 2003).

We have not adjusted the analysis of socioeconomic gradients in one health-related behaviour with regard to the other health-related behaviours. Health-related behaviours may indeed cluster, but it is open to discussion whether they should be considered as confounders of each other, i.e. having a causal relationship with both the determinant (change of age) and the outcome under study, i.e. another health-related behaviour. We think that the most valid approach is to consider them as outcomes with partially identical causes (such as SEP), but having no direct causal effects on each other. For that reason, we have not adjusted our analyses for the effects of other outcomes.

This study has several strengths and limitations. A major strength of our study is its longitudinal design. The main limitation of this study, just as in every longitudinal research project using self-administered postal questionnaires in adolescents, is the relatively low response rate. Compared to females and better-educated males, low-educated males responded slightly less. However, differences in response rates by SEP were relatively small, thereby biased results due selective non-response are less probable. The period of young adulthood is associated with changes of permanent residence. Some of the respondents became independent of their parents and changed residence; large numbers of respondents became simply unreachable because of study or work in another part of the country or abroad. According to data from the Statistical Office of Slovak Republic, about 7.5% of all employed Slovak citizens were employed abroad. A very substantial part of this group consists of young people aged from 18 to 30 years. This may explain some of the differences in response rate we found in terms of gender and SEP, but probably only a part of them. Another

limitation stems from the way in which we performed the McNemar test. Data was stratified not only by gender but also by every indicator of SEP and this resulted in 48 different p-values. Multiple testing may have affected some of our findings.

Conclusion

In conclusion, our follow-up study contributes to the debate on health inequality by investigating the relationship between SEP and health-related behaviour in late adolescence and early adulthood, which is relatively rarely investigated. The results show that the dynamics of HRB change are related to SEP and gender. Socioeconomic differences in HRB established in adolescence remained stable until young adulthood among males but not among females. Some diminution of the gender gap in smoking was confirmed. Initiation into HRB takes place during the turmoil of adolescence, which is characterized by many personal and social changes. It is difficult to capture and understand the dynamics within which the uptake of HRB takes place. More longitudinal research is needed to fully understand the process by which age, SEP and HRB influence health.

Chapter 7

Does social support mediate or moderate socioeconomic differences in self-rated health among adolescents?*

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Abstract

Objective.

Social support is assumed to be a protective social determinant of health. The aim of this cross-sectional study was to explore whether social support from the father, mother and friends mediates or moderates the association between socioeconomic position and self-rated health among adolescents.

Methods.

The sample consisted of 1,863 secondary school students from the Kosice region in Slovakia (mean age 16.85; 53.3% females, response rate 98.9%). We assessed the mediation and moderation effects of social support from the mother, father and friends on the relation between socioeconomic position and self-rated health, performing binary logistic regression models. Socioeconomic position was measured by parents' education, the family affluence scale and financial strain.

Results.

Social support from the father mediated the association between family affluence and self-rated health among both males and females and the association between financial strain and self-rated health among males only. No moderating effect of social support on socioeconomic dif¬ferences in self-rated health was found.

Conclusion.

Father involvement seems to have the potential to mediate socioeconomic differences in health during adolescence.

Introduction

Social support has been recognised as an important social determinant of health. Social support itself represents a sal¬utogenic factor in the model of Antonovsky (1987), and it is assumed to affect health by providing instrumental or emo¬tional help which buffer stressful situations and their adverse health effects (Murberg and Bru 2004; Ellis et al. 2009). There is considerable evidence suggesting that social support is beneficial to health (Knesebeck and Geyer 2007), yet, there is a lack of information, particularly in relation to adolescence, on the role of this possible protective psycho¬social factor with regard to socioeconomic differences in health (Matthews et al. 2010). Obtaining and utilising social support is likely to be established in adolescence and is similar to, for example, most health-related behaviours. Patterns acquired in adolescence may then affect the further course of a person's life; this also holds for the effects of socioeconomic differences in social support.

An association of social support with mortality and morbidity as well as with self-rated health has been pre¬viously shown (Kawachi and Berkman 2001; Melchior et al. 2003; Lett et al. 2005). Data on health outcomes among children indicate that emotional support in partic¬ular has an impact on both psychological and physical health outcomes; strong associations are seen between social support and psychological well being (Gruenewald and Seeman 2010). Childhood exposure to less responsive parenting has been related to an increased risk of childhood illness (Repetti et al. 2002).

Social support may be a contributing factor in explaining the relatively poorer health of those in lower socioeconomic groups (Taylor and Seeman 1999; Stansfeld et al. 2003). However, in some studies the contribu¬tion of social support to socioeconomic differences in mental health is minimal (Turner and Marino 1994; Geckova et al. 2003). According to Huurre et al. (Huurre et al. 2007), there are different pathways through which social support may play a role in the relationship between socioeco¬nomic position and health, either as a mediator or as a moderator. Regarding the first, social support may posi¬tively influence health and may be unequally distributed among social classes, which leads to unequal exposure to the protective effect of social support against poor health among social classes. Evidence shows that levels of social support are indeed higher among adolescents with higher socioeconomic position (Geckova et al. 2003; Weyers et al. 2008; Weyers et al. 2010). Lower income adolescents tend to have poorer social networks (Weyers et al. 2008), fewer organisational involvements (Schoon and Parsons 2002) and less social support from both the community and family members (Schoon and Parsons 2002; Weyers et al. 2010). These hold for both genders, but the differences appear to be somewhat greater for men (Marmot et al. 1997). However, evidence among adults also suggests important moderating effects of social support on the association between socioeconomic position and health (Ryff et al. 2004), as well as between socioeconomic position and physical functioning (Unger et al. 1999). Regarding moderation, the differences in effects of social support on health by social class may be due to differences in vulnerability (Gruenewald and Seeman 2010).

Hence social support could serve as mediator as well as a moderator in the relationship between socioeconomic position and health. Studies which assess both of these roles of social support have been lacking until now. Therefore, the aim of this study was to explore whether social support from the father, mother and friends mediates or moderates the association between socioeconomic position and self-rated health.

Methods

Sample

Data were collected in winter 2002 among secondary school students from the Kosice region in Slovakia. Par¬ents were informed prior to the study via the school administration in a regular meeting of parents with the school staff and could opt out if they disagreed with their child's participation. Children were informed prior to the study; participation was fully voluntary and on anony¬mous basis in the absence of their teachers and in the presence of the researcher. Selected schools were strati¬fied according to the five educational levels of the regular Slovak school system, and classes within schools were chosen randomly. The study sample consisted of 2,014 students, from which 1992 responded (response rate 98.9%). Non-response (n = 22) was mainly due to the absence from school. One hundred twenty-nine question¬naires (representing 6.4% of the study sample) were excluded because of missing data values in the indicators of socioeconomic position, self-rated health or social support, resulting in 1,863 analysed questionnaires. The mean age of the respondents was 16.85 years (SD 1.1), and 53.4% of them were females.

The study was done according to the ethical require¬ments formulated by the Agreement on Human Rights and Biomedicine (40/2000 Slovak Code of Laws). The Science and Technology Assistance Agency also approved the ethical aspects of the study in its decision on APVT-20-003602 in April 2002.

Measures

Indicators of socioeconomic position

Three measures were used as indicators of socioeconomic position: the highest educational level of parents, family affluence and perceived financial strain. The parents' education level was based on the parent with the highest level of education attained. It was classified as—I. Uni-versity, II. Secondary school and III. Apprenticeship or primary school only.

Family affluence was measured using an indicator of consumption and material deprivation developed by Currie et al. (2008). The scale used in the present study is com¬posed of four questions concerning possession of a car, telephone or computer in the family, and the respondents having their own room. Possible answers were: no; yes, one; yes, several, for the first three questions; and no/yes for the last question. The composite family affluence scale score (range 4–11) was trichotomised (4–6 high family affluence/7–9 medium family affluence/10–11 low family affluence). Cronbach's a was 0.68.

Financial strain was measured by asking the respon¬dents to define the occurrence of perceived financial strain on a five point scale (very often–often–sometimes–rarely–never). The variable was dichotomised (sometimes–rarely– never/very often–often).

Perceived social support

Perceived social support from the mother, father and friends was assessed using the modified and shortened version of the Provisions and Social Relations Scale (Turner

and Marino 1994). The questionnaire was focused on perceived emotional social support. For example, it asks about closeness with parents and friends, time to talk with parents and friends, a feeling of being a worthwhile person, being relaxed and himself/herself in the presence of parents and friends, feeling that parents and friends are always here and a feeling of parents' and friends' confidence in ado¬lescents. The questionnaire consisted in a total of 18 items (6 items per source). Each item has a four-point response scale. For each domain of social support (mother, father and friends) a separate composite score was computed, with a higher score meaning higher social support. All scales showed satisfactory internal reliability (Cronbach's alpha varied from 0.84 to 0.87).

Self-rated health

Self-rated health is widely used in health studies because it is generally accepted as a good predictor of morbidity and mortality (Idler and Benyamini 1997; Andresen et al. 2003). Respondents rated their health using the five-point Likert scale from 1 (excellent) to 5 (bad). For the purpose of the analyses, the variable was dichotomised (excellent and very good health/and good, fairly good and bad). We adhered to cut-offs that had been used in the previous studies (Tuinstra et al. 1998; Geckova et al. 2003; Bacikova-Sleskova et al. 2007; Salonna et al. 2008b).

Table 1 Characteristics of study variables by gender (n=1863, Kosice region, 2002)

	Males		Females		Total	
	n=868		n=995		n=1863	
	Number (Mean)	% (SD)	Number (Mean)	% (SD)	Number (Mean)	% (SD)
Age	(16.91)	(1.11)	(16.80)	(1.10)	(16.85)	(1.11)
Parents' education level						
University	235	27.1	242	24.3	477	25.6
Secondary high school	465	53.6	558	56.1	1023	54.9
Apprentice or elementary school	168	19.4	195	19.6	363	19.5
Family affluence						
High	106	12.2	63	6.3	169	9.1
Medium	605	69.7	673	67.6	1578	68.6
Low	157	18.1	259	26.0	416	22.3
Financial strain						
Very often/often	70	8.1	121	12.2	191	10.3
Sometimes/rarely/never	798	91.9	874	87.8	1972	89.7
Self-rated health						
Good (excellent, very good)	647	74.5	607	61.0	1254	67.3
Bad (good, fair, bad)	221	25.5	388	39.0	609	32.7
Social support from						
Mother	(20.25)	(3.19)	(20.25)	(3.48)	(20.25)	(3.35)
Father	(18.72)	(4.16)	(17.87)	(4.34)	(18.27)	(4.28)
Friends	(19.77)	(2.79)	(20.52)	(2.85)	(20.18)	(2.85)

Percentages do not always add up to 100 due to rounding

Statistical analyses

We first assessed the background characteristics of the sample. Second, socioeconomic differences in social support were analysed using ANOVA. Next, to test for possible mediating and/or moderating effects of social support, binary logistic regression models were per¬formed. Analyses were done separately for both genders, three sources of social support (from mother, father and friends), and three indicators of socioeconomic position (educational level of parents, family affluence and financial strain). In the first step, the association of the particular indicator of socioeconomic position with self-rated health was explored using binary logistic regression. In the second step, in order to explore the possible mediating effect of social support, the association of socioeconomic position with self-rated health was adjus¬ted for the sources of social support. In the third step of the models, when testing for a moderating effect of social support, the interaction variable (the cross product of socioeconomic position and social support) was included. The continuous variable (social support) was centred to eliminate multicollinearity effects between the predictor and moderator, and the interaction terms during modera¬tion/mediation analyses. For this purpose, the sample mean of social support was subtracted from all individual scores on the variable. All binary logistic regression models were adjusted for age. Analyses were performed using the Statistical Package for the Social Sciences (SPSS), version 16.

Results

Socioeconomic differences in social support

Table 1 gives the descriptive information about adoles¬cents' age, socioeconomic position (measured by parents' education level, family affluence and financial strain), self-rated health and perception of social support from the mother, father and friends. No significant socioeconomic differences were found in perceived social support from the mother. However, we found that perceived social support from fathers was significantly lower in both males and females with low family affluence and more frequent financial strain. No statistically significant socioeconomic differences were found in perceived social support from friends, with the exception of financial strain among females (Table 2).

Socioeconomic position and self-rated health

The assessment of the effect of socioeconomic position on self-rated health showed that the lower the education of the parents, the higher the probability of adolescents reporting poor self-rated health. Similarly, respondents reporting lower wealth and more frequently experienced financial strain have a higher probability of rating their own health as poor (Table 3). Among males all three socioeconomic position indicators (educational level of parents, family affluence and financial strain) were statistically signifi¬cantly associated with self-rated health, but among females, only the association of family affluence with self-rated health was statistically significant (Table 3).

Table 2 Socio-economic differences in social support (ANOVA, n=1863, Kosice region, 2002)

	Social support from											
	Mother				Father				Friends			
	n	mean	F	p	n	mean	F	p	n	mean	F	p
Males												
Parents' education level												
University	235	20.20	0.08	0.923	235	18.53	1.33	0.265	235	19.83	0.15	0.855
Secondary high school	465	20.26			465	18.93			465	19.72		
Apprentice or elementary school only	168	20.33			168	18.40			168	19.83		
Family affluence												
High	106	19.78	1.41	0.243	106	18.80	4.68	0.010	106	20.07	0.87	0.420
Medium	605	20.30			605	18.94			605	19.77		
Low	157	20.41			157	17.81			157	19.61		
Financial strain												
Sometimes/rarely/never	798	20.29	1.03	0.309	798	18.89	17.50	0.000	798	19.83	3.73	0.054
Very often/often	70	19.89			70	16.74			70	19.16		
Females												
Parents' education level												
University	242	20.26	1.85	0.157	242	18.26	1.31	0.269	242	20.66	2.26	0.105
Secondary high school	558	20.10			558	17.78			558	20.59		
Apprentice or elementary school only	195	20.66			195	17.65			195	20.13		
Family affluence												
High	63	19.54	2.68	0.069	63	18.78	7.43	0.001	63	20.49	0.60	0.551
Medium	673	20.18			673	18.11			673	20.58		
Low	259	20.59			259	17.03			259	20.36		
Financial strain												
Sometimes/rarely/never	874	20.30	1.36	0.243	874	18.14	27.06	0.000	874	20.63	11.60	0.001
Very often/often	121	19.90			121	15.98			121	19.69		

Table 3 Effects of social support from the mother, father and friends on socioeconomic differences in self-rated health (odds ratios (OR) and 95% confidence intervals (CI) for reporting poor health)

	controlled for social support from mother	P [1]		P [1]	controlled for social support from father	P [1]	controlled for social support from friends	P [1]
Males	OR (CI)		OR (CI)		OR (CI)		OR (CI)	
Parents' education level								
University	1	*	1	*	1	*	1	*
Secondary high school	1.24(0.85-1.81)		1.25(0.86-1.83)		1.30(0.86-1.90)		1.24(0.85-1.81)	
Apprentice or elementary school only	1.75(1.12-2.74)		1.78(1.13-2.79)		1.76(1.12-2.78)		1.77(1.12-2.77)	
Social support			0.95(0.90-0.99)		0.93(0.90-0.96)		0.93(0.88-0.99)	
Family affluence								
High	1	*	1	*	1	n.s.	1	*
Medium	1.31(0.79-2.19)		1.36(0.81-2.23)		1.33(0.79-2.23)		1.29(0.79-2.16)	
Low	2.01(1.12-3.59)		2.09(1.17-3.77)		1.88(1.04-3.38)		1.96(1.17-3.62)	
Social support			0.95(0.90-0.99)		0.93(0.90-0.97)		0.94(0.88-0.98)	
Financial strain								
Sometimes/rarely/never	1	**	1	*	1	n.s.	1	*
Very often/often	1.96(1.18-3.25)		1.92(1.15-3.20)		1.66(0.99-2.85)		1.87(1.13-3.13)	
Social support			0.95(0.91-1.00)		0.93(0.90-0.97)		0.94(0.89-0.99)	

[1] *P-value, significance for whole model; * p<0.05; ** p<0.01; n.s. not significant*

Table 3 Effects of social support from the mother, father and friends on socioeconomic differences in self-rated health (odds ratios (OR) and 95% confidence intervals (CI) for reporting poor health)

	controlled for social support from mother	P [1]		P [1]	controlled for social support from father	P [1]	controlled for social support from friends	P [1]
Females								
Parents' education level								
University	1	n.s.	1	n.s.	1	n.s.	1	n.s.
Secondary high school	1.14(0.84-1.56)		1.13(0.83-1.55)		1.11(0.81-1.52)		1.14(0.83-1.56)	
Apprentice or elementary school only	1.32(0.90-1.94)		1.36(0.92-2.00)		1.27(0.86-1.88)		1.27(0.86-1.88)	
Social support			0.94(0.91-0.98)		0.91(0.91-0.96)		0.93(0.89-0.97)	
Family affluence								
High	1	**	1	*	1	n.s.	1	n.s.
Medium	1.38(0.79-2.41)		1.44(0.82-2.54)		1.32(0.75-2.33)		1.39(0.80-2.47)	
Low	1.94(1.08-3.50)		2.09(1.15-3.79)		1.74(0.96-3.16)		1.94(1.12-3.63)	
Social support			0.94(0.91-0.98)		0.94(0.91-0.96)		0.93(0.89-0.98)	
Financial strain								
Sometimes/rarely/never	1	n.s.	1	n.s.	1	n.s.	1	n.s.
Very often/often	1.30(0.89-1.91)		1.28(0.87-1.88)		1.12(0.76-1.67)		1.22(0.83-1.80)	
Social support			0.95(0.91-0.98)		0.93(0.91-0.96)		0.93(0.89-0.97)	

[1] *P-value, significance for whole model; * p<0.05; ** p<0.01; n.s. not significant*

Mediating effect of social support from the mother, father and friends on socioeconomic differences in self-rated health

In the second step, the mediating effect of social support on the association between socioeconomic position and self-rated health was assessed. When social support from the mother was introduced in the regression models, only minor changes in the effect estimates for the effect of socioeconomic position on self-rated health were found (Table 3). Similarly, only minor changes in the effect estimates for the effect of socioeconomic position on self-rated health were found after introduction of social support from either friends or from the father into the model regarding differences in self-rated health by parental edu¬cational level (Table 3). However, introduction of social support from the father changed the effect estimates in the regression models assessing the effect of family affluence on self-rated health, which indicates a mediating effect of social support from the father. A mediating effect was found among males as well among females (Table 3). Similarly, social support from the father also changed effect estimates for the relation between financial strain and self-rated health, but this mediating effect was found only among males (Table 3).

Moderating effect of social support on socioeconomic differences in self-rated health

In the third step, the moderating effects of social support on the association between socioeconomic position and self-rated health were assessed. Interaction terms indicating moderation did not contribute to any model with statistical significance. Hence social support from the mother, father, and friends did not moderate the relation between socio¬economic indicators and self-rated health (Table 4).

Discussion

The aim of this study was to explore whether social support from different sources mediates or moderates the associa¬tion between socioeconomic position and self-rated health. Results indicate a mediating effect of social support from the father on the association between family affluence and self-rated health among males and females, and a mediating effect of social support from the father on the association between financial strain and self-rated health among males only. Lower levels of social support are associated with worse health. No mediation effects of social support from the mother or friends on socioeconomic differences in self¬ rated health were found. Similarly, no moderation effect of social support from any source on socioeconomic differ¬ences in self-rated health was found. In line with this are the findings of Yarcheski and Mahon (1999) who did not show a moderating role of social support on the relationship between perceived stress and symptom patterns among adolescents. Also no moderation effect on socioeconomic differences in health among Slovak adolescents was found by Geckova et al. (2003).

Our findings show that the role of social support in the relation between socioeconomic status and health also varies by type of socioeconomic indicator. This is in line with findings of Geyer et al. (2006), which indicate that education, income and occupational class cannot be used interchangeably as indicators of one hypothetical social dimension. Although modestly correlated, they measure different phenomena and tap into different causal mechanisms.

A lower educational level of parents or a lower family affluence could be considered as predisposing to stressful life events (Melchior et al. 2003; Seeman et al. 2010; Mezuk et al. in press), but perceived financial strain repre¬sents an already acute or chronic stressful situation. For every life event that socially disadvantaged individuals' experience, their already scarce resources may be further depleted. Approaching their network with multiple chronic and acute events, rather than a single acute event, might overwhelm the network's already limited resources and availability (Mickelson and Kubzansky 2003). Further¬more, their network is more likely to be coping with similar stressful situations (Bassuk et al. 1996).

Table 4 Moderation effects of social support from the mother, father and friends on socioeconomic differences in self-rated health (Slovakia - Kosice region, 2002, odds ratios (OR) and 95% confidence intervals (CI) for reporting poor health)

	controlled for social support from					
	mother	father	friends	mother	father	friends
	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)
	Males			Females		
Education of parents						
Uni	1.0 *	1.0 n.s.	1.0 n.s..	1.0 n.s.	1.0 n.s.	1.0 n.s.
Second	1.2(0.8-1.8)	1.3(0.9-1.9)	1.3(0.9-1.9)	1.2(0.8-1.6)	1.1(0.8-1.6)	1.2(0.8-1.6)
Appr	1.7(1.1-2.7)	1.7(1.1-2.8)	1.7(1.1-2.8)	1.4(0.9-2.0)	1.3(0.9-1.9)	1.3(0.9-1.9)
SoS	1.0(0.9-1.1)	0.9(0.9-1.0)	0.9(0.8-1.0)	0.9(0.9-1.0)	0.9(0.8-1.0)	1.0(0.9-1.1)
Uni*SoS	1.0 n.s.	1.0 n.s.	1.0 n.s..	1.0 n.s.	1.0 n.s.	1.0 n.s.
Second by SoS	0.9(0.8-1.0)	1.0(0.9-1.1)	1.1(0.9-1.2)	1.0(0.9-1.1)	1.1(0.9-1.1)	1.0(0.9-1.1)
Appr by SoS	1.0(0.9-1.1)	1.0(0.9-1.1)	1.0(0.8-1.1)	1.0(0.9-1.1)	1.1(0.9-1.2)	1.0(0.9-1.1)
Family affluence						
High FA	1.0*	1.0*	1.0*	1.0*	1.0 n.s.	1.0*
Medium FA	1.3 (0.8-2.2)	1.3(0.8-2.2)	1.3(0.8-2.2)	1.6(0.9-3.0)	1.3(0.7-2.2)	1.4(0.8-2.5)
Low FA	2.0(1.1-3.6)	1.9(1.0-3.4)	2.0(1.1-3.6)	2.3(1.2-4.4)	1.7(0.9-3.1)	1.9(1.0-3.5)
SoS	1.1(0.9-1.2)	1.0(0.9-1.1)	1.0(0.9-1.2)	0.9(0.7-1.0)	0.9(0.8-1.0)	0.9(0.7-1.0)
High FA*SoS	1.0 n.s.	1.0 n.s.	1.0 n.s..	1.0 n.s.	1.0 n.s.	1.0 n.s.
Medium FA by SoS	0.9(0.8-1.0)	0.9(0.8-1.0)	0.9(0.8-1.1)	1.1(1.0-1.3)	1.1(0.9-1.2)	1.1(0.9-1.3)
Low FA by SoS	0.9(0.7-1.0)	0.9(0.8-1.1)	1.0(0.8-1.2)	1.1(0.9-1.3)	1.1(0.9-1.3)	1.1(0.9-1.3)
Financial strain						
Low FinS	1.0*	1.0*	1.0*	1.0 n.s.	1.0 n.s.	1.0*
High FinS	2.0(1.2-3.3)	2.0(1.2-3.4)	1.9(1.1-3.2)	1.2(0.8-1.7)	1.1(0.7-1.7)	1.1(0.7-1.7)
SoS	0.9(0.9-1.0)	0.9(0.9-1.0)	0.9(0.9-1.0)	1.0(0.9-1.0)	0.9(0.9-1.0)	0.9(0.9-1.0)
Low FinS*SoS	1.0 n.s.	1.0 n.s.	1.0 n.s..	1.0 n.s.	1.0 n.s.	1.0 n.s.
High FinS by SoS	1. 1(0.9-1.2)	1.1(1.0-1.2)	1.0(0.9-1.2)	1.0(0.9-1.1)	1.0(0.9-1.1)	1.0(0.9-1.1)

Uni University; Second Secondary high school; Appr Apprentice or elementary school; SoS Social support; FA Family affluence; FinS Financial strain

** p<0.05; n.s. not significant*

Our results suggest that fathers and mothers have different roles in the development of socioeconomic differences in self-rated health during adolescence. While no mediation effect of social support from the mother was found in the association between socioeconomic position and self-rated health of adolescents, social support from the father mediated the association between family affluence and self-rated health among both males and females and the association between financial strain and self-rated health among males. Some studies have indi-cated that males and females could exhibit different reactions in stressful situations (Taylor et al. 2000; Reevy and Maslach 2001). Taylor et al. (2000) proposed that, although fight-or-flight may characterise the primary physiological responses to stress for both males and females, females' responses are behaviourally more marked by a pattern of 'tend-and-befriend'. Tending involves nurturing activities in order to promote safety and reduce distress for offspring; befriending is the cre¬ation and maintenance of social networks that may aid in this process. Fathers who had highly stressful workdays were more likely to withdraw from their families (Repetti 1989). Contrary to this, on days when mothers reported that their stress levels at work had been the highest, their children reported that their mothers had shown them more love and nurturing (Wood and Repetti 1997). The access of adolescents to social support from the father seems to be more negatively influenced by socioeconomic position than social support from the mother. If lower socioeco¬nomic position means a higher probability of stressful life situations, then the fact that males tend to give less social support under stressful conditions than females could explain a part of the mediating effect of a father's social support on the association between socioeconomic posi¬tion and self-rated health.

In addition, this effect could be enhanced by different needs in received social support of the offspring during late adolescence when compared to their needs during child¬hood. The ability to perceive social support and the actual needs of particular types of social support tends to change over the lifespan (Uchino 2009). From a developmental point of view, adolescence is a stage when offspring start to clearly break away from the family, cutting off some emotional but still not material links. Adolescents seem to allow decreased parental emotional support because they are able to gain such support from sources outside the family, while instrumental support from parents seems to have high importance. Del Valle et al. (2010), in an assessment of social support networks with a sample of 884 Spanish adolescents aged 12–17, reported a decrease in emotional support, while the instrumental support of par¬ents did not decrease significantly throughout adolescence. The need for instrumental support during adolescence is probably also a factor explaining parental differences in the mediating role of social support in the association between socioeconomic differences and self-rated health. According to Reevy and Maslach (2001), a masculine personality provides and receives different types of social support than a feminine one. Masculine qualities appear to be helpful in receiving particular types of instrumental support, while feminine qualities are at advantage in regard to social support interactions and are better prepared to provide, seek and receive emotional support (Reevy and Maslach 2001). Even though we did not focus on instrumental support in this study, among the indicators that we did assess family affluence apparently has the closest relation to the abilities of a family to provide instrumental support. This topic deserves further attention in research.

Strengths and limitations

The key strengths of this study are its large representative sample oriented towards the general population and its high response rate; as a result, selection bias in this sample is unlikely. The study also has some limitations. First, only subjective self-reports were used for measuring individual aspects. However, the previous studies support the validity of such self-reports (Reijnch makes conclusive statements about causality in our findings impossible. They thus need to be con¬firmed in a study with a longitudinal design. A third limitation was a lack of information on family structure. We could not identify whether a respondent evaluated social support from a biological parent, a step-parent or from another person serving as a parent, so we could not link the partnership situation of parents with data on perceived social support.

Conclusion

This study is one of the few investigations that focus on the possible role of social support when examining socioeco¬nomic differences in self-rated health among adolescents. To conclude our results, it seems that social support from the father mediates the association between certain indi¬cators of socioeconomic position and self-rated health of adolescents, in contrast to social support from the mother and from friends. Even if the importance of social support from the mother is often emphasised in stressful life situ¬ations, paternal involvement seems to also have the potential to mediate socioeconomic differences in health. A father and mother could alternate or complement each other in providing their children with different types of social support, and active parental involvement seems to have the potential to affect the self-rated health of their offspring. However, more research is needed for a deeper understanding of the mediating role of paternal social support in socioeconomic differences in self-rated health. Particularly, a culture-oriented approach is needed, as the socially expected roles of father and mother could be dif¬ferent across countries. For example, in some countries being a father traditionally goes with family role of ‘‘breadwinner’’. Both pressure from social expectations and internal pressures given by this role could influence the psychological functioning of a father and accordingly social support provided by him. Thus, the effect of parental support on adolescents’ health may be also different in different cultural settings.

Chapter 8

General discussion

This final chapter provides a short summary of the main findings of this study and a discussion of these findings on a general level and in the context of socioeconomic health inequalities. It further provides a discussion of the strengths and limitations of the study and finally of its implications for future research and for practice.

8.1 Main findings

Research question 1

Do changes over time in self-reported health occur between ages 15 – 19 years?

We performed a longitudinal study to clarify the direction and magnitude of changes in health status in a cohort of 15-year-old adolescents who were followed-up to the age of 19. Both boys and girls reported significant deterioration in vital¬ity and mental health, while only boys re-ported deterioration in self-rated health. However, we identified not only deterioration, but also improvement and stability in self-reported health among boys and girls. Significantly more girls than boys reported an improvement in mental health and vitality, while more boys than girls reported a deterioration in vitality.

Research question 2

Do socioeconomic differences occur in the change over time in health among adolescents between ages 15 – 19 year?

We found no differences in change of health for males using the educational level of the respondents and the educational level and occupational status of the parents as socioeconomic position indicators. This means that the pattern of socioeconomic differences in the health of males from the 15th year of life remained the same until their 19th year of life. Females from lower socioeconomic groups reported a more substantial decrease in health than those from higher socioeconomic groups, resulting in bigger socioeconomic gradients in health at age 19 than at age 15.

Research question 3

Are there differences in socioeconomic inequalities in self-rated health among Slovak adolescents between 1998 and 2006?

Traditional socioeconomic gradients (the lower the socioeconomic position, the higher the prevalence of poor health) in self-rated health were found in both males and females in 1998 and 2006, although they were statistically significant only for females. We found a trend of decreasing indexes of dissimilarity from 1998 to 2006. The trend was more visible among females than among males.

Research question 4

Do socioeconomic inequalities occur in changes in health-related behaviour among Slovak adolescents between ages 15 and 19 years?

Statistically significant increases between ages 15 and 19 were found in all health-related behaviours. At age 15 almost no socioeconomic differences in health-related

behaviour were found, but at age 19 such differences were found for almost all socioeconomic indicators. Variations in socioeconomic differences in health-related behaviour were more apparent among females than among males. Among males, only traditional socioeconomic gradients were found (the lower the socioeconomic position, the higher the prevalence of potentially harmful health-related behaviour), while among females reverse socioeconomic gradients were also found, for example, in alcohol consumption or marijuana use.

Research question 5

Does social support mediate or moderate socioeconomic differences in self-rated health among adolescents?

We found a mediating effect of social support from the father on the association between family affluence and self-rated health among adolescent males and females, and a mediating effect of social support from the father on the association between financial strain and self-rated health among only males. No mediation effects of social support from the mother or from friends on socioeconomic differences in self-rated health were found. Similarly, no moderation effect of social support from any source on socioeconomic differences in self-rated health was found.

8.2 Discussion of the main findings

The main findings will be discussed in the framework of the general aims formulated in Chapter 1. Firstly, we will focus on changes in health status in a cohort of 15-year-old adolescents who were followed-up to the age of 19; secondly, on the socioeconomic differences in changes of SRH in the same cohort; and thirdly on the period effect of patterns of SRH comparing cohorts of Slovak adolescents from 1998 and from 2006. As a fourth step we will discuss whether changes of health-related behaviours contribute in a cohort of 15-year-old adolescents followed-up to the age of 19. Finally, we will turn our attention to social support from mother, father and friends as mediators or moderators of socioeconomic differences in SRH among adolescents.

Change in health from age 15 to 19

Even though adolescence is traditionally viewed as an age period of good somatic health, adolescents' psychosocial health problems may have major implications for adult morbidity and mortality (Ghandour et al. 2004; Piko 2007). Assessment of their self-perceived health and its correlates deserves attention. In line with that we performed a longitudinal study to clarify the direction and magnitude of changes in health status in a cohort of 15-year-old adolescents who were followed-up to the age of 19.

Both boys and girls reported a significant deterioration in vital¬ity and mental health, while only boys re¬ported deterioration in self-rated health. However, we identified not only deterioration, but also improvement and stability in self-reported health among boys and girls. Significantly more girls than boys reported an improvement in mental health and vitality, while more boys than girls reported deterioration in vitality. Other studies covering health in adolescence mostly reported either stability or deterioration of health status in the period between the ages of

15 and 19 years (Wade et al. 2000; Simeoni et al. 2001; Piko 2007). Furthermore, some studies reported alternating periods of deterioration and stability in health status (Hankin et al. 1998; Wight et al. 2004). As most of previously mentioned studies used various health indicators at different measurement points, an international comparison using comparable indicators in shorter repeated measurement intervals would be worthwhile in the debate over this topic.

Our findings revealed improvements, stability or less-steep deterioration in self-reported health during adolescence. This could be partially explained by factors linked to psychosocial and biological changes during puberty. The onset of puberty influences body satisfaction and overall psychological adjustment among both boys and girls (Mendle et al. 2010). Due to the lack of serious physical illnesses at their age, adolescents tend to describe psychosocial aspects of their health, e.g., psychological well-being, as a frame of reference for health perceptions (Piko 2007). In addition, adolescents tend to focus on making sense of their bodily experiences, which clearly impact their health perceptions (Haugland 2001). Improvements in self-reported health during adolescence could be partially explained by the suggestion that adolescents' health perceptions are more affected by the psychosocial and biological changes of puberty at age 15 than at age 19.

Gender differences were found in the direction and magnitude of changes in health status. Significantly more girls than boys reported an improvement in mental health and vitality, while more boys than girls reported deterioration in vitality. This could be because women, compared with men, consider a broader set of factors when making general ratings of health, e.g., psychological factors and minor subjective health complaints (Benyamini et al. 2000). The fact that puberty among females has an earlier onset compared with males (Parent 2003) could also explain part of these differences.

Change in socioeconomic differences in health from age 15 to 19

Three broad conceptual models (latent effects/timing model, pathway effects/change model and cumulative effects/accumulation model) can be used to stipulate when and how implications of SEP-related physical and psychosocial exposures during childhood and adolescence might be of interest for adult health (Cohen et al. 2010).

We found no statistically significant socioeconomic gradients of poor SRH among males at age 15, and this pattern was similar at age 19. Among females, traditional, statistically significant, socioeconomic gradients were found (the lower the socioeconomic position, the higher the prevalence of poor health) both at age 15 and age 19. Socioeconomic gradients in SRH at age 19 remained stable even after controlling for SRH at 15, so the SEP-SRH gradient at age 19 among females could not be explained only by the SEP-SRH gradient already occurring at age 15.

As the pattern of SEP-related health differences among males remained stable from age 15 to age 19, we could frame the relation between SEP and health of adolescent males into the latent effects/timing model. This model stipulates that SEP differences in health are established early in life and remain fairly constant throughout childhood and adolescence. The relation between SEP and health being consistent with this model was previously described, for example, by Halldorsson et al. (2000) for chronic conditions and physical health complaints and by Starfield et al. (2002) and Case et al. (2005) for self-reported health. These studies, however, used cross-

sectional data, and consequently they assessed the age effect rather than the cohort effect in our study; furthermore, they were not focussed on gender differences.

As mentioned above, the SEP-SRH gradient at age 19 among females could not be explained only by the SEP-SRH gradient at age 15. A part of the explanation for this might be sensitivity to stress. Several studies have indicated that early adolescence is marked by the emergence of sex differences in both stress sensitivity and depressive symptoms (McClure et al. 2004; Greaves-Lord et al. 2009; van Oort et al. 2011). The emergence of gender differences in the prevalence of mental health problems starts between ages 10 and 15, during pubertal development (Kuehner 2003; Andersen and Teicher 2008; Bosch et al. 2009). This specific period is suggested to play a role due to hormonal changes, specifically the rise in female sex hormones. Findings of Bosch (2011) confirm that the transition to adolescence is accompanied by a substantial rise in depressive problems in girls compared with boys, and show that girls' hypothalamic-pituitary-adrenal axis is more sensitive to long-term alterations caused by chronic stress. Considering the higher level of chronic stress among individuals with lower socioeconomic status (McEwen and Gianaros 2010), this could also explain part of the socioeconomic differences.

The gap in health between socioeconomic groups widens from age 15 to age 19 much more among females than males. Explanation for this could be framed into the cumulative effects/accumulation model. It is based on the presumption that the intensity and duration of the exposure to unfavourable environments adversely affects health status according to a dose-response relation (Ben-Schlomo and Kuh 2002). Since females tend to have higher stress sensitivity compared with males during adolescence, exposure to the same dose of stress among females could lead to stronger response, manifested in bad health, than among males.

Among females, a traditional gradient of socioeconomic differences in SRH was found at age 15, becoming more distinct at age 19. Thus, our findings among females could potentially fit into the pathway effects/change model which hypothesises that the early life environment sets individuals onto life trajectories that in turn affect their health status over time (Smith 1999). Our findings regarding males did not fit into this model. Even though this concept may not seem appropriate for the period of adolescence or young adulthood, it may still be useful over a longer period. An adolescencent's move from childhood into physical maturity is characterised by substantial psychosocial and biological changes; thus, the effects of early environment on health could be obscured to some extent during this period.

Comparison of different cohorts of adolescents in different periods

Historical time and the impact of historical contexts (period effects) could also affect age-related changes in SEP patterns in health (Mayer 2009). Adverse circumstances experienced by those with low SEP in childhood and adolescence may be very different in one generation vs. another and therefore may lead to different health effects (Galobardes 2004). Taking this into account, one of the aims of this study was to assess whether the historical period has influence on differences in socioeconomic inequalities in self-rated health among Slovak adolescents in 1998 and in 2006. We found traditional socioeconomic gradients (the lower the socioeconomic position, the higher the prevalence of poor health) in self-rated health in 1998 and 2006, although they were stronger for females. We noticed a decrease in the magnitudes

of socioeconomic differences in health from 1998 to 2006, measured by indexes of dissimilarity. This was more visible among females than among males.

A possible explanation could be linked to adversity in childhood and adolescence during the political regime change. In the early 1990s Central European countries went through a turbulent period of political, economic and health care reforms connected with a severe downturn of the economy and the standard of living. Whereas adolescents from the 1998 cohort were born on average 6 years before the system change and spent the following 8 years of their lives during the most turbulent period of transformation, their counterparts from the 2006 cohort were born 2 years after the political system reforms. But even in times of the most complicated economic reforms in Slovakia, the health care system in fact did not collapse (Hlavačka et al. 2004). Despite the limited financial resources allocated to public health, Slovakia has one of the highest levels of immunization within Europe, implementing WHO Expanded Programme on Immunization (WHO 2012). Medical treatment and drug prescriptions during childhood and adolescents are free, or only marginal payments are charged (Hlavačka et al. 2004). So the affordability of adequate health care could not be the sole factor playing a role in the SEP-health relationship.

Our findings may result from a shift in the social, cultural, economic and physical environment ending in an overall move towards an individualistic and democratic society with a social market-oriented economy. Slovakia today differs from Slovakia in 1998, not only in economic terms but also in the overall character of society. Similarly to other Central European countries, it has been transformed during the last 20 years from a "collectivistic" to a more "individualistic" society (Hancock and Logue 2000; Hofstede et al. 2010; Wallace et al. 2012). This change in values is much more pronounced among the younger part of the population. Some studies report that the mental health of adolescents could be more affected by the overall character of society than that of older people (MONEE Project 2000; Gale and Fahey 2005). In a recent study by Ferguson et al. (2010), adolescents from Denmark, the United States and South Korea were compared regarding adolescents' life satisfaction and perceived autonomy support among individualistic and collectivistic nations. Their results showed that the cross-national differences in school and life satisfaction were mediated by adolescents' perceptions of autonomy support from authorities. Danish adolescents reported the highest life satisfaction and perceived autonomy support, followed by the American and Korean adolescents, respectively. Also, studies by Gilman (2008) and Park (2005) showed that adolescents who live in individualistic nations report higher well-being than those in collectivistic nations. Slovakia, compared with western European countries, is a traditionally collectivistic society (Kolman et al. 2003), although it is gradually acquiring more individualistic characteristics (Hofstede et al. 2010). This shift may explain the decrease in SE differences as shown by decreasing indexes of dissimilarity from 1998 to 2006.

Health-related behaviour

We found almost no socioeconomic differences in health-related behaviour at age 15, but differences for almost all socioeconomic indicators at age 19. Variations in socioeconomic differences in health-related behaviour were more apparent among females than among males.

Among males, only traditional socioeconomic gradients were found (the lower the socioeconomic position, the higher the prevalence of potentially harmful

health-related behaviour), while among females reverse socioeconomic gradients were also found, for example, in alcohol consumption or marijuana use. However, this ambiguous result fits with those of previous studies on the association of SEP and HRB. According to the literature review by Hanson and Chen (2007), the most frequently reported finding was the absence of socioeconomic gradients, while some authors reported traditional socioeconomic gradients: higher SEP associated with less use; and some reported reversed socioeconomic gradients: the higher the SEP, the greater the use. The character of the socioeconomic gradients was usually determined by the type of socioeconomic indicator used. The findings of previous studies suggest that the relationship between the social status of parents (e.g. educational or occupational status) as socioeconomic indicators and marijuana use is more likely to show no (Olsson et al. 2003; Piko and Fitzpatrick 2007) or a traditional association (Miller and Miller 1997; Wichstrøm and Pedersen 2001), whereas the relationship between financial resources (Chen and Killeya-Jones 2006) or self-assessed SEP (Piko and Fitzpatrick 2007) as indicators and marijuana use is more likely to be reversed. However, some study results are not fully consistent with these findings (Hanson and Chen 2007).

Socioeconomic gradients regarding insufficient physical activity found at age 19 were much more pronounced among females than among males. This is consistent with the results of several previous studies (Wardle et al. 2003; Fahlman et al. 2006; Pitel et al. 2010; Veselska et al. 2011). For females, their school type and the education level of their parents appeared to be statistically significant predictors of physical inactivity. The largest difference in insufficient physical activity was observed among females following low-level education and with low-educated parents. Females may be more likely to exercise if they are enrolled in a formal activity, such as a dance class or swimming lessons (Vilhjalmsson and Kristjansdottir 2003). Even though lower education is usually associated with lower income, the inaccessibility of sports facilities due to high costs could explain this effect only partially. Overall, these findings suggest that a higher family social status or prestige may be a stronger influence on physical activity than financial resources (Hanson and Chen 2007). Females are considered to be more attentive to their health than males, and the more educated females are even more careful than the less educated (Uitenbroek et al. 1996). An explanation for this kind of normative behaviour could be a better ability to make informed choices by more educated females (Vilhjalmsson and Kristjansdottir 2003).

According to Luthar and Latendresse (2005), high-SEP adolescents engage in negative health behaviours in order to combat the stress, anxiety and depression they experience from achievement pressures. This type of pressure could occur in particular among the less academically successful children of highly-educated parents. In combination with the higher availability of money and negative peer influence, the group having parents with high social status could become more susceptible to negative health-related behaviour. These explanations require additional study.

Role of social support in socioeconomic differences in health during adolescence

One of the aims of this study was to explore whether social support from different sources mediates or moderates the associa¬tion between socioeconomic position and self-rated health. No moderation effect of social support from any source on socioeconomic differ¬ences in self-rated health was found. This is in line with the

findings of Yarcheski and Mahon (1999), who did not show a moderating role of social support on the relationship between perceived stress and symptom patterns among adolescents. Also, no moderation effect on socioeconomic differences in health among Slovak adolescents was found by Geckova et al. (2003).

However, regarding the potential mediating effect of social support, our results suggest that fathers and mothers have different roles in the development of socioeconomic differences in self-rated health during adolescence. While we found a mediating effect of social support from the father on the association between SEP and self-rated health among adolescents, we did find any mediation effect of social support from the mother on these associations. This could be partially explained by the different needs in received social support of offspring during late adolescence when compared with their needs during child¬hood (Uchino 2009). Adolescents seem to allow decreased parental emotional support because they are able to gain such support from sources outside the family, while instrumental support from parents seems to have high importance (del Valle et al. 2010). According to Reevy and Maslach (2001), masculine qualities appear to be helpful in receiving particular types of instrumental support, while feminine qualities are at an advantage in regard to social support interactions and are better prepared to provide, seek and receive emotional support.

Our finding may be interpreted as showing that social support is an important environmental resource. The role of paternal social support as a mediator of socioeconomic differences in health was confirmed in the age of late adolescence.

8.3 Strengths and limitations of the study

Strengths

The key strengths of this study are that it combines both longitudinal and cross-sectional designs, and most of the samples have very high response rates. Moreover, we had follow-up on a group of adolescents, and studies regarding this age group are not very common. The use of repeated cross-sectional data allowed us to compare socioeconomic differences during time periods. This is especially important for countries like Slovakia which went through a serious societal and economic transition during the past 20 years.

With regard to health status, we used a broad range of health indicators comprising general, physical and psychological health and well-being. This enabled us to have a wider look at socioeconomic position and their relationships with several health outcomes.

Limitations

Although this study provides an important view on the relation between socioeconomic position and adolescents' health and extends the existing knowledge on this topic, it is important to recognise its limitations.

Selection bias

A first limitation is the relatively low response rate at follow-up in the longitudinal studies. In particular low-educated males responded slightly less than the remainder of the initial sample. However, differences in response rates by SEP were relatively small, making bias due selective non-response less probable.

With regard to the cross-sectional samples used within this study, very high response rates were achieved (around 97%; see Chapter 2). Selection bias in these samples is therefore unlikely. Moreover, sampling was performed in such a way that data were representative for Slovakia as a whole.

Information bias

Due to the use of self-report data, information bias may be present, mainly with regard to health and the financial situation of respondents. Self-rated health is widely used in many different cultural contexts and the findings indicate that it is a valid and powerful indicator for morbidity and mortality (Idler and Benyamini 1997; Reijneveld et al. 2003), which correlates well with other more complex health indexes (Andresen et al. 2003; Mikolajczyk et al. 2008).

The question could be raised, whether it is really the adolescents' health status or only their view on their health which is measured. However, as has already been mentioned, the use of self-reported health indicators among adolescents is very frequent because the occurrence of serious, objectively-measurable illness is rare at this age (Hammarstrom and Janlert 1997). Therefore, it provides more meaningful results than other measures. Self-reported questionnaires were also used to assess the adolescents' socioeconomic position. These subjective indicators were used in line with Currie's suggestions (Currie et al. 2000) and in line with the evidence that subjective perception of a family's financial situation is more meaningful for children and adolescents than objective income or income loss (Lempers et al. 1989; Hagquist 1998).

Potential confounding factors

In this study the effect of SEP on adolescents' health was assessed, and social support was considered as a possible mediator of these relationships. However, not only this factor may mediate the SEP-health relationships.

We did not control our analyses for family structure and stability, which, according to previous studies (Heck and Parker 2002; Leininger and Ziol-Guest 2008; Waldfogel et al. 2010), could be also considered as confounders of SEP-health relationships. Family instability, for example, seems to matter more than family structure for cognitive and health outcomes, whereas growing up with a single mother (whether that family structure is stable or unstable over time) seems to matter more than instability for behaviour problems (Waldfogel et al. 2010). According to Heck and Parker (2002), at high levels of maternal education, family structure did not influence the number of physician visits or having a usual source of care, as expected. However, at low levels of maternal education, single mothers appeared to be better at accessing care for their children. On the other hand, according to findings of Leininger and Ziel-

Guest (2008), children who reside in single-father families exhibit poorer access to health care than children in other family structures. Unlike residing in a single-mother family, the effects of residence in a single-father family do not vary by socioeconomic status.

Another possible confounder of the SEP-health relationships could be ethnicity (LaVeist 2005; Yang et al. 2009). Our research samples were created from students at all types of primary and secondary schools of the Slovak educational system regardless of ethnicity. As Slovak regulations do not allow information about nationality or ethnicity to be recorded, we were not able to control our analyses for these variables. Even though there are a number of ethnic minorities in Slovakia, the situation of the Roma population concerning socioeconomic differences in health is specific. Roma are well-known for their low educational status, high unemployment and poverty and for living in very poor conditions, especially those Roma living in so-called settlements. All of these factors result in very low socioeconomic status (SES) and may contribute to worse health among Roma (Kolarcik et al. 2009).

8.4 Implications

Evidence-based policy making on the social determinants of health offers the best hope of tackling health inequities (MEKN 2007). This requires good data on the extent of the problem and up-to-date evidence on the determinants and on what works to reduce health inequities. It also requires an understanding of the evidence, among policy-makers and practitioners, such that social determinants of health are acted on (CSDH 2008).

Implications for practice

It is well-known that adolescents of low socioeconomic status are a more vulnerable group than their peers of higher socioeconomic status and should thus be a target group for health-promotion programmes/interventions. According to our results females from lower socioeconomic position in particular are at higher risk of poor health. They also have a higher prevalence of sedentary behaviour. Females from lower socioeconomic positions should thus be a particular target group for health-preserving activities. From intervention studies, it is known that parental influences, peer support, school-based physical education and length of physical activity time at school (Kahn et al. 2002; Matson-Koffman et al. 2005; Schmied and Tully 2009) are important, changeable determinants of physical activity in youth. To achieve substantial behaviour change, preventive interventions should target changes in important determinants from different categories (social, psychological, and environmental) simultaneously (Van Der Horst et al. 2007).

Our results showed that improvement in self-reported health also occurs among adolescents from lower socioeconomic positions. Such evidence could be an argument when convincing policy makers that investment in health-promoting activities among adolescents from low socioeconomic position can be both meaningful and effective.

In line with the recommendation of the WHO Commission on Social Determinants of Health (2008), training policy actors, stakeholders and practitioners

on the social determinants of health and investing in raising public awareness and education on the social determinants of health are highly important. Medical and health professionals need to be aware of health inequities as an important public health problem. Training and education on the social determinants of health needs to be extended to other practitioners, policy actors and stakeholders. Professionals, such as urban planners, transport planners, teachers and architects, are in a privileged position to act on the social determinants of health.

It is also important to focus on the understanding of the social determinants of health among the general public as a new part of health literacy. Health literacy is the, "ability to access, understand, evaluate and communicate information as a way to promote, maintain and improve health in a variety of settings across the life-course" (Kickbusch et al. 2006). It is also the ability of public and private sector actors to communicate health-related information in relevant and easy-to-understand ways (MEKN 2007). This requires improving awareness and knowledge of health literacy among health professionals. Also, policies need to be developed on the use of clear language and visual symbols in health communications (Rootman and Gordon-El-Bihbety 2008).

Implication for further research

Evidence-based policy making on the social determinants of health is important for tackling health inequities (MEKN 2007). From a research perspective this requires good data on the extent of the problem and up-to-date evidence on the determinants and on what works to reduce health inequities (CSDH 2008).

Generating evidence on what works to reduce health inequities is a complex process. We found no socioeconomic differences in health among males ages 15 and 19, even though they are well described during adulthood. To track the onset of socioeconomic differences, further research involving more psychosocial factors should be performed to achieve a better understanding of sex differences in socioeconomic gradients during adolescents. In addition, more longitudinal studies, with shorter time intervals and also overlapping childhood and adulthood, should be designed to determine factors that may explain changes in mental and physical health and their (causal) paths.

Moreover, evidence on the social determinants of health can be context dependent. Responses to inequities will reflect a wide range of factors, including the culture and history of a country and its political environment. This could be more important in Central European countries undergoing societal transition such as Slovakia. Understanding the impact that context has on health inequities and the effectiveness of interventions requires a rich evidence base that includes both qualitative and quantitative data (MEKN 2007). Improving the availability of data and building a minimum health equity surveillance system would be helpful to move the agenda of socioeconomic inequalities in health forward (Madarasova-Geckova 2009). Due to a lack of data, certain groups might be overly supported, while others might be neglected, and precious governmental resources can only be spent one time. The routine monitoring of socioeconomic inequalities in health as well as the evaluation of the health equity impact of policy measures and actions are critical to improving health and health system outcomes, yet they remain generally limited or marginal within mainstream health governance functions and institutional capacity.

8.5 Conclusion

Studying the effect of socioeconomic variables on the health status of adolescents is of great relevance. Adolescence is a critical period with long-term implications for the health and well-being of each individual. Related to this, adolescence may be the most important period to intervene and invest in establishing healthy patterns. This study explored the health status of young people in Slovakia using several subjective health indicators and several health determinants, with a special focus on socioeconomic position. In answering the research questions formulated in this thesis, we conclude the following.

Firstly we found that the self-reported health of adolescents changes between ages 15 and 19. However, there is not only deterioration, but also improvement and stability in self-reported health. Next, we focussed on the changes in socioeconomic differences in health among adolescents between ages 15 to 19. The pattern of socioeconomic differences in the health of males from their 15th year of life remained stable until their 19th year of life. Females from lower socioeconomic groups reported a more substantial decrease of health than those from higher socioeconomic groups, resulting in bigger socioeconomic gradients in health at age 19 than at age 15. In addition to our interest in changes in inequalities in health from age 15 to age 19, we explored differences in socioeconomic inequalities in self-rated health among two different cohorts of Slovak adolescents, one in 1998 and the other in 2006. We found that the magnitudes of socioeconomic differences in self-reported health from 1998 to 2006 decreased. Furthermore, we assessed social support and its role in socioeconomic differences in self-rated health among adolescents. We found that social support from father is a mediator of socioeconomic differences among adolescents. Finally, we identified that at age 15 almost no socioeconomic differences occur in health-related behaviour, but at age 19 such differences were established for almost all socioeconomic indicators. We found that variations in socioeconomic differences in health-related behaviour were more apparent among females than among males. Among males, only traditional socioeconomic gradients were present (the lower the socioeconomic position, the higher the prevalence of potentially harmful health-related behaviours), while among females reverse socioeconomic gradients were also found, e.g. in alcohol consumption or marijuana use.

References

Aarnio, M., Winter,T., Peltonen,J., Kujala,U.M., and Kaprio,J. 2002. Stability of leisure-time physical activity during adolescence--a longitudinal study among 16-, 17- and 18-year-old Finnish youth. *Scandinavian Journal of Medicine & Science in Sports* 12 (3): 179-85.

Adler, N.E., and Stewart,J. 2010. Health disparities across the lifespan: Meaning, methods, and mechanisms. *Biology of Disadvantage: Socioeconomic Status and Health* 1186 : 5-23.

Andersen, R., Crespo,C., Bartlett,S., Cheskin,L., and Pratt,M. 1998. Relationship of physical activity and television watching with body weight and level of fatness among children. *The Journal of the American Medical Association* 279 (12): 938-42.

Andersen, S.L., and Teicher,M.H. 2008. Stress, sensitive periods and maturational events in adolescent depression. *Trends in Neurosciences* 31 (4): 183-91.

Andresen, E.M., Catlin,T.K., Wyrwich,K.W., and Jackson-Thompson,J. 2003. Retest reliability of surveillance questions on health related quality of life. *Journal of Epidemiology and Community Health* 57 (5): 339-43.

Andrews, F.M. 1996. Psychological well-being:four single-item indicators of well-being. In *Measuring health: a guide to rating scales and questionnaires*., eds. I. McDowell, C. Newell, 194-198. New York: Oxford University Press.

Antonovsky, A. 1987. *Unraveling the mystery of health: how people manage stress and stay well.* The Jossey-Bass social and behavioral science series. San Francisco etc.: Jossey-Bass Publishers.

Bacikova-Sleskova, M., van Dijk,J.P., Geckova,A.M., Nagyova,I., Salonna,F., Reijneveld,S.A., and Groothoff,J.W. 2007. The impact of unemployment on school leavers' perception of health. Mediating effect of financial situation and social contacts? *International Journal of Public Health* 52, (3), 10.1007/s00038-007-6071-4 ER.

Barbeau, E.M., Krieger,N., and Soobader,M. 2004. Working Class Matters: Socioeconomic Disadvantage, Race/Ethnicity, Gender, and Smoking in NHIS 2000. *American Journal of Public Health* 94 (2): 269-78.

Barker, D.J.P., Forsen,T., Uutela,A., Osmond,C., and Eriksson,J.G. 2001. Size at birth and resilience to effects of poor living conditions in adult life: longitudinal study. *British Medical Journal* 323 (7324): 1273-6.

Bassuk, E.L., Weinreb,L.F., Buckner,J.C., Browne,A., Salomon,A., and Bassuk,S.S. 1996. The characteristics and needs of sheltered homeless and low-income housed mothers. *JAMA* 276 (8): 640-6.

Ben-Schlomo, Y., and Kuh,D. 2002. A life course approach to chronic disease epidemiology: conceptual models, empirical challenges and interdisciplinary perspectives. *International Journal of Epidemiology* 31 : 285-93.

Benyamini, Y., Leventhal,E.A., and Leventhal,H. 2000. Gender differences in processing information for making self-assessments of health. *Psychosomatic Medicine* 62 (3): 354-64.

Bergstrom, E., Hernell,O., and Persson,L.A. 1996. Cardiovascular risk indicators cluster in girls from families of low socio-economic status. *Acta Paediatrica* 85 (9): 1083-90.

Bobakova, D., Madarasova Geckova,A., Reijneveld,S.A., and van Dijk,J.P. 2012. Subculture affiliation is associated with substance use of adolescents. *European Addiction Research* 18, (2), 10.1159/000334614.

Boomsma, D.I., Koopmans,J.R., Van Doornen,L.J., and Orlebeke,J.F. 1994. Genetic and social influences on starting to smoke: a study of Dutch adolescent twins and their parents. *Addiction* 89 (2): 219-26.

Boonstra, H. 2001. The 'Add Health' Survey: Origins, Purposes and Design. *The Guttmacher Report on Public Policy* 4, (3), http://www.guttmacher.org/pubs/tgr/04/3/gr040310.html (accessed May 8, 2012).

Bosch, N.M. 2011. Adolescents in stress: The ups and downs of the psychophysiological stress

response. PhD Dissertation. University of Groningen.

Bosch, N.M., Riese,H., Dietrich,A., Ormel,J., Verhulst,F.C., and Oldehinkel,A.J. 2009. Preadolescents' somatic and cognitive-affective depressive symptoms are differentially related to cardiac autonomic function and cortisol: the TRAILS study. *Psychosomatic Medicine* 71 (9): 944-50.

Braveman, P. 2006. *Health disparities and health equity: Concepts and measurement*. Vol. 27. Palo Alto, Calif.: Annual Reviews, Inc.

Brückner, H. 2004. *Gender inequality in the life course: social change and stability in West Germany*, 1975-1995 . Hawthorne, N.Y.: Aldine de Gruyter.

Brückner, H., and Mayer,K.U. 2005. De-Standardization of the Life Course: What it Might Mean? And if it Means Anything, Whether it Actually Took Place? *Advances in Life Course Research* 9 : 27-53.

Burke, V., Milligan,R.A., Beilin,L.J., Dunbar,D., Spencer,M., Balde,E., and Gracey,M.P. 1997. Clustering of health-related behaviors among 18-year-old Australians. *Preventive medicine* 26 (5 Pt 1): 724-33.

Call, K., Riedel,A., Hein,K., McLoyd,V., Petersen,A., and Kipke,M. 2002. Adolescent health and well-being in the twenty-first century: A global perspective. *Journal of Research on Adolescence* 12 (1): 69-98.

Case, A., Fertig,A., and Paxson,C. 2005. The lasting impact of childhood health and circumstance. *Journal of Health Economics* 24, (2), 10.1016/j.jhealeco.2004.09.008.

Caspersen, C.J., Pereira,M.A., and Curran,K.M. 2000. Changes in physical activity patterns in the United States, by sex and cross-sectional age. *Medicine and Science in Sports and Exercise* 32 (9): 1601-9.

Chen, E., Langer,D.A., Raphaelson,Y.E., and Matthews,K.A. 2004. Socioeconomic status and health in adolescents: the role of stress interpretations. *Child Development* 75 (4): 1039-52.

Chen, E., Matthews,K.A., and Boyce,W.T. 2002. Socioeconomic differences in children's health: How and why do these relationships change with age? *Psychological Bulletin* 128 (2): 295-329.

Chen, E., Cohen,S., and Miller,G.E. 2010. How Low Socioeconomic Status Affects 2-Year Hormonal Trajectories in Children. *Psychological Science* 21 (1): 31-7.

Chen, K.W., and Killeya-Jones,L.A. 2006. Understanding differences in marijuana use among urban Black and suburban White high school students from two U.S. community samples. *Journal of Ethnicity in Substance Abuse* 5 (2): 51-73.

Cohen, J. 1988. *Statistical power analysis for the behavioral sciences.* Hillsdale, N.J.: L. Erlbaum Associates.

Cohen, S., Doyle,W.J., Turner,R.B., Alper,C.M., and Skoner,D.P. 2004. Childhood socioeconomic status and host resistance to infectious illness in adulthood. *Psychosomatic Medicine* 66 (4): 553-8.

Cohen, S., Janicki-Deverts,D., Chen,E., and Matthews,K.A. 2010. Childhood socioeconomic status and adult health. *Annals of the New York Academy of Sciences* 1186 : 37-55.

Conger, R.D., Conger,K.J., Elder,G.H., Lorenz,F.O., Simons,R.L., and Whitbeck,L.B. 1992. A Family Process Model of Economic Hardship and Adjustment of Early Adolescent Boys. *Child Development* 63 (3): 526.

Conrad, K.M., Flay,B.R., and Hill,D. 1992. Why children start smoking cigarettes: predictors of onset. *British Journal of Addiction* 87 (12): 1711-24.

Courtenay, W.H., McCreary,D.R., and Merighi,J.R. 2002. Gender and ethnic differences in health beliefs and behaviors. *Journal of Health Psychology* 7 (3): 219-31.

CSDH. 2008. Closing the gap in a generation: health equity through action on the social determinants of health. *Final Report of the Commission on Social Determinants of Health.* Geneva: World Health Organization.

Cullen, K.W., Koehly,L.M., Anderson,C., Baranowski,T., Prokhorov,A., Basen-Engquist,K., Wetter,D., and Hergenroeder,A. 1999. Gender differences in chronic disease risk behaviors through the transition out of high school. *American Journal of Preventive Medicine* 17 (1): 1-7.

Currie, C., K. Hurrelmann, et al. 2000. *Health and health behaviour among young people.* Copenhagen: WHO Regional Office for Europe.

Currie, C., Roberts,C., Morgan,A., Smith,R., Settertobulte,W., Samdal,O., and Barnekow Rasmussen,V. 2004. Young People's Health in Context: international report from the HBSC 2001/02 survey. *Health Policy for Children and Adolescents.* Vol. 4. Copenhagen: WHO Regional Office for Europe.

Currie, C.E., Elton,R.A., Todd,J., and Platt,S. 1997. Indicators of socioeconomic status for adolescents: the WHO Health Behaviour in School-aged Children Survey. *Health Education Research* 12 (3): 385-97.

Currie, C., Molcho,M., Boyce,W., Holstein,B., Torsheim,T., and Richter,M. 2008. Researching health inequalities in adolescents: The development of the Health Behaviour in School-Aged Children (HBSC) Family Affluence Scale. *Social Science & Medicine* 66 (6): 1429-36.

Cyranowski, J.M., Frank,E., Young,E., and Shear,M.K. 2000. Adolescent onset of the gender difference in lifetime rates of major depression: a theoretical model. *Archives of General Psychiatry* 57 (1): 21-7.

del Valle, J.F., Bravo,A., and López,M. 2010. Parents and peers as providers of support in adolescents' social network: A developmental perspective. *Journal of Community Psychology* 38 (1): 16-27.

Diewald, M., Goedicke,A., and Mayer,K.,Ulrich. 2006. *After the fall of the wall: life courses in the transformation of East Germany.* Stanford, Calif.: Stanford University Press.

DiLiberti, J. 2000. The relationship between social stratification and all-cause mortality among children in the United States: 1968-1992. *Pediatrics* 105 (1): e2.

Donato, F., Monarca,S., Chiesa,R., Feretti,D., Modolo,M.A., and Nardi,G. 1995. Patterns and covariates of alcohol drinking among high school students in 10 towns in Italy: a cross-sectional study. *Drug and Alcohol Dependence* 37 (1): 59-69.

Durlak, J.A., and Wells,A.M. 1997. Primary prevention mental health programs for children and adolescents: a meta-analytic review. *American Journal of Community Psychology* 25 (2): 115-52.

Eikemo, T.A., Kunst,A.E., Judge,K., and Mackenbach,J.P. 2008. Class-related health inequalities are not larger in the East: a comparison of four European regions using the new European socioeconomic classification. *Journal of Epidemiology and Community Health* 62 (12): 1072-8.

Elgar, F.J., Roberts,C., Parry-Langdon,N., and Boyce,W. 2005. Income inequality and alcohol use: a multilevel analysis of drinking and drunkenness in adolescents in 34 countries. *European Journal of Public Health* 15 (3): 245-50.

Ellis, A.A., Nixon,R.D.V., and Williamson,P. 2009. The effects of social support and negative appraisals on acute stress symptoms and depression in children and adolescents. *British Journal of Clinical Psychology* 48 : 347-61.

Emerson, E., Graham,H., and Hatton,C. 2006. Household income and health status in children and adolescents in Britain. *European Journal of Public Health* 16 (4): 354-60.

Evans, G.W. 2006. Child development and the physical environment. *Annual Review of Psychology* 57 : 423-51.

Evans, G.W., and Kantrowitz,E. 2002. Socioeconomic status and health: the potential role of environmental risk exposure. *Annual Review of Public Health* 23 : 303-31.

Fahlman, M.M., Hall,H.L., and Lock,R. 2006. Ethnic and socioeconomic comparisons of fitness, activity levels, and barriers to exercise in high school females. *The Journal of School Health* 76 (1): 12-7.

Ferguson, Y.L., Kasser,T., and Jahng,S. 2010. Differences in Life Satisfaction and School Satisfaction Among Adolescents From Three Nations: The Role of Perceived Autonomy Support. *Journal of Research on Adolescence* 21 (3): 649-61.

Flay, B., and J. Petraitis. 1994. The Theory of Triadic Influence: A new theory of health behavior with implications for preventive interventions. In *Advances in Medical Sociology.*, ed. G. Albrecht. Vol. 4, 19-44. Greenwich: JAI Press.

Friis, R.H., Wittchen,H.U., Pfister,H., and Lieb,R. 2002. Life events and changes in the course of depression in young adults. *European Psychiatry* 17 (5): 241-53.

Fussell, E., and F.F.J. Furstenberg. 2005. The transition to adulthood during the twentieth century: race, nativity,and gender. In *On the Frontier of Adulthood: Theory, Research and Public Policy*., eds. Richard A. Settersten, Frank F. Furstenberg and Rubén G. Rumbaut, 29-75. Chicago, USA: University of Chicago Press.

Gale, F., and Fahey,S. 2005. Youth in Transition: The Challenges of Generational Change in *Asia. Bangkok: Regional Unit for Social and Human Sciences in Asia and the Pacific*, UNESCO.

Galobardes, B. 2004. Childhood Socioeconomic Circumstances and Cause-specific Mortality in *Adulthood: Systematic Review and Interpretation.* Epidemiologic Reviews 26, (1), 10.1093/epirev/mxh008.

Gauthier, A.H., and F.F. Furstenberg. 2005. Historical Trends in the Patterns of Time Use among Young Adults in Developed Countries. I*n On the Frontier of Adulthood: Theory, Research and Public Policy.*, eds. Richard A. Settersten, Frank F. Furstenberg and Rubén G. Rumbaut, 150-176. Chicago, USA: University of Chicago Press.

Geckova, A. 2002. *Inequality in health among slovak adolescents.* PhD Dissertation. University of Groningen.

Geckova, A., van Dijk,J.P., Groothoff,J.W., and Post,D. 2002. Socio-economic differences in health risk behaviour and attitudes towards health risk behaviour among Slovak adolescents. *Sozial- und Praventivmedizin* 47 (4): 233-9.

Geckova, A., van Dijk,J.P., Stewart,R., Groothoff,J.W., and Post,D. 2003. Influence of social support on health among gender and socio-economic groups of adolescents. *European Journal of Public Health* 13 (1): 44-50.

Geckova, A.M., van Dijk,J.P., Zezula,I., Tuinstra,J., Groothoff,J.W., and Post,D. 2004. Socio-economic differences in health among Slovak adolescents. *Sozial- und Praventivmedizin* 49 (1): 26-35.

Geckova, A., Tuinstra,J., Pudelsky,M., Kovarova,M., van Dijk,J.P., Groothoff,J.W., and Post,D. 2001. Self-reported health problems of Slovak adolescents. *Journal of Adolescence* 24 (5): 635-45.

Gesthuizen, M., Huijts,T., and Kraaykamp,G. 2011. Explaining health marginalisation of the lower educated: the role of cross-national variations in health expenditure and labour market conditions. *Sociology of Health & Illness*, 10.1111/j.1467-9566.2011.01390.x.

Geyer, S., Hemstroem,O., Peter,R., and Vageroe,D. 2006. Education, income, and occupational class cannot be used interchangeably in social epidemiology. Empirical evidence against a common practice. *Journal of Epidemiology and Community Health* 60 (9): 804-10.

Ghandour, R.M., Overpeck,M.D., Huang,Z.J., Kogan,M.D., and Scheidt,P.C. 2004. Headache, stomachache, backache, and morning fatigue among adolescent girls in the United States: associations with behavioral, sociodemographic, and environmental factors. *Archives of Pediatrics & Adolescent Medicine* 158 (8): 797-803.

Gilman, R. 2008. Cross-national adolescent multidimensional life satisfaction reports. *Journal of Youth and Adolescence* 37 : 142-54.

Glendinning, A., Hendry,L., and Shucksmith,J. 1995. Lifestyle, health and social class in adolescence. *Social Science & Medicine* 41 (2): 235-48.

Glendinning, A., Love,J.G., Hendry,L.B., and Shucksmith,J. 1992. Adolescence and Health Inequalities - Extensions to Macintyre and West. *Social Science & Medicine* 35 (5): 679-87.

Glendinning, A., Shucksmith,J., and Hendry,L. 1994. Social class and adolescent smoking behaviour. *Social Science & Medicine* 38 (10): 1449-60.

Glenn, N.D. 2003. Distinguishing Age, Period, and Cohort Effects. In *Handbook of the Life Course*., eds. J. T. Mortimer, M. J. Shanahan, 465-476. New York: Kluwer Academic/Plenum.

Goodman, E., Adler,N.E., Kawachi,I., Frazier,A.L., Huang,B., and Colditz,G.A. 2001. Adolescents' perceptions of social status: development and evaluation of a new indicator. *Pediatrics* 108 (2): E31.

Gordon-Larsen, P., Nelson,M.C., and Popkin,B.M. 2004. Longitudinal physical activity and sedentary behavior trends: adolescence to adulthood. *American Journal of Preventive Medicine* 27 (4): 277-83.

Graham, H. 2007. *Unequal Lives: Health and Socio-economic Inequalities.* Maidenhead: McGraw Hill/Open University Press.

Greaves-Lord, K., Huizink,A.C., Oldehinkel,A.J., Ormel,J., Verhulst,F.C., and Ferdinand,R.F. 2009. Baseline cortisol measures and developmental pathways of anxiety in early adolescence. *Acta Psychiatrica Scandinavica* 120 (3): 178-86.

Green, G., Macintyre,S., West,P., and Ecob,R. 1991. Like parent like child? Associations between drinking and smoking behaviour of parents and their children. *British Journal of Addiction* 86 (6): 745-58.

Gruenewald, T.L., and T.E. Seeman. 2010. Social Support and Physical Health:Links and Mechanisms. In *Handbook of Behavioaral Medicine: Methods and Applications.*, ed. Andrew Steptoe. 1st ed. Vol. XXIV, 225. New York Dordrecht Heidelberg London: Springer.

Habicht, J., Kiivet,R.A., Habicht,T., and Kunst,A.E. 2009. Social inequalities in the use of health care services after 8 years of health care reforms - a comparative study of the Baltic countries. *International Journal of Public Health* 54, (4), 10.1007/s00038-009-8012-x.

Hagquist, C.E.I. 1998. Economic stress and perceived health among adolescents in Sweden. *Journal of Adolescent Health* 22 (3): 250-7.

Halldorsson, M., Kunst,A.E., Kohler,L., and Mackenbach,J.P. 2000. Socioeconomic inequalities in the health of children and adolescents. A comparative study of the five Nordic countries. *The European Journal of Public Health* 10 (4): 281-8.

Hammarstrom, A., and Janlert,U. 1997. Nervous and depressive symptoms in a longitudinal study of youth unemployment-selection or exposure? *Journal of Adolescence* 20 (3): 293-305.

Hancock, M.D., and Logue,J. 2000. *Transitions to capitalism and democracy in Russia and Central and Eastern Europe: achievements, problems, prospects.* Westport, Conn: Praeger.

Hankin, B.L., Abramson,L.Y., Moffitt,T.E., Silva,P.A., McGee,R., and Angell,K.E. 1998. Development of depression from preadolescence to young adulthood: emerging gender differences in a 10-year longitudinal study. *Journal of Abnormal Psychology* 107 (1): 128-40.

Hanson, M.D., and Chen,E. 2007. Socioeconomic status and health behaviors in adolescence: a review of the literature. *Journal of Behavioral Medicine* 30 (3): 263-85.

Harrell, J.S., Pearce,P.F., Markland,E.T., Wilson,K., Bradley,C.B., and McMurray,R.G. 2003. Assessing physical activity in adolescents: common activities of children in 6th-8th grades. *Journal of the American Academy of Nurse Practitioners* 15 (4): 170-8.

Hartgers, C., Van den Hoek,J.A., Coutinho,R.A., and Van der Pligt,J. 1992. Psychopathology, stress and HIV-risk injecting behaviour among drug users. *British Journal of Addiction* 87 (6): 857-65.

Haugland, S. 2001. Subjective health complaints in adolescence: a cross-national comparison of prevalence and dimensionality. *The European Journal of Public Health* 11 (1): 4-10.

Heck, K.E., and Parker,J.D. 2002. Family structure, socioeconomic status, and access to health care for children. *Health Services Research* 37 (1): 173-86.

Hemmingsson, T., and Lundberg,I. 2001. Development of alcoholism: interaction between heavy adolescent drinking and later low sense of control over work. *Alcohol and Alcoholism* (Oxford, Oxfordshire) 36 (3): 207-12.

Hemmingsson, T., and Lundberg,I. 2005. How far are socioeconomic differences in coronary heart disease hospitalization, all-cause mortality and cardiovascular mortality among adult Swedish males attributable to negative childhood circumstances and behaviour in adolescence? *International Journal of Epidemiology* 34 (2): 260-7.

Hertzman, C. 1999. The biological embedding of early experience and its effects on health in adulthood. Socioeconomic Status and Health in Industrial Nations: S*ocial, Psychological, and Biological Pathways* 896 : 85-95.

Hidalgo, I., Garrido,G., and Hernandez,M. 2000. Health status and risk behavior of adolescents in the north of Madrid, Spain. The Journal of adolescent health : official publication of the *Society for Adolescent Medicine* 27 (5): 351-60.

Hillmert, S., and Mayer,K.U. 2004. *Geboren 1964 und 1971: Neuere Untersuchungen zu Ausbildungs- und Berufschancenin Westdeutschland*. Wiesbaden: VS-Verlag f ur Sozialwissenschaften.

Hlavačka, S., Wágner,R., and Riesberg,A. 2004. *Health care systems in transition:* Slovakia. Vol. 6. Copenhagen: WHO Regional Office for Europe on behalf of the European Observatory on

Health Systems and Policies.

Hofstede, G., Hofstede,G.J., and Minkov,M. 2010. *Cultures and Organizations: Software of the Mind.* 3 edition ed. USA: McGraw-Hill.

Huisman, M., Kunst,A.E., and Mackenbach,J.P. 2003. Socioeconomic inequalities in morbidity among the elderly; a European overview. *Social Science & Medicine* 57 : 861-73.

Huisman, M., Kunst,A.E., and Mackenbach,J.P. 2005. Educational inequalities in smoking among men and women aged 16 years and older in 11 European countries. *Tobacco control* 14 (2): 106-13.

Huurre, T., Aro,H., and Rahkonen,O. 2003. Well-being and health behaviour by parental socioeconomic status: a follow-up study of adolescents aged 16 until age 32 years. *Social Psychiatry and Psychiatric Epidemiology* 38 (5): 249-55.

Huurre, T., Eerola,M., Rahkonen,O., and Aro,H. 2007. Does social support affect the relationship between socioeconomic status and depression? A longitudinal study from adolescence to adulthood. *Journal of Affective Disorders* 100 (1-3): 55-64.

Huurre, T., Rahkonen,O., Komulainen,E., and Aro,H. 2005. Socioeconomic status as a cause and consequence of psychosomatic symptoms from adolescence to adulthood. *Social Psychiatry and Psychiatric Epidemiology* 40 (7): 580-7.

Idler, E., and Benyamini,Y. 1997. Self-rated health and mortality: a review of twenty-seven community studies. *Journal of Health and Social Behavior* 38 : 21-37.

Jankovic, J., Simic,S., and Marinkovic,J. 2010. Inequalities that hurt: demographic, socio-economic and health status inequalities in the utilization of health services in Serbia. *European Journal of Public Health* 20, (4), 10.1093/eurpub/ckp189.

Jansen, M.E., and Sikkel,D. 1981. Verkorte versie van de VOEG—schaal(Abbreviated version of the Questionnaire on Self-Perceived Health). *Gedrag & Samenleving* 2 : 78-82.

Kahn, E.B., Ramsey,L.T., Brownson,R.C., Heath,G.W., Howze,E.H., Powell,K.E., Stone,E.J., Rajab,M.W., and Corso,P. 2002. The effectiveness of interventions to increase physical activity: A systematic review. *American Journal of Preventive Medicine* 22 (4, Supplement 1): 73-107.

Karvonen, S., and Rimpela,A. 1996. Socio-regional context as a determinant of adolescents' health behaviour in Finland. *Social Science & Medicine* 43 (10): 1467-74.

Kawachi, I., Adler,N.E., and Dow,W.H. 2010. Money, schooling, and health: Mechanisms and causal evidence. *Annals of the New York Academy of Sciences* 1186 : 56-68.

Kawachi, I., and Berkman,L.F. 2001. Social ties and mental health. *Journal of Urban Health* 78 (3): 458-67.

Kawachi, I., Kennedy,B.P., Lochner,K., and Prothrow-Stith,D. 1997. Social capital, income inequality, and mortality. *American Journal of Public Health* 87 (9): 1491-8.

Kawachi, I., Subramanian,S.V., and Almeida-Filho,N. 2002. A glossary for health inequalities. *Journal of Epidemiology and Community Health* 56 (9): 647-52.

Kenobi, W.O., 2009. *Health disparities and health equity: The universe concepts and measurement*. Vol. 27. Cape Canaveral, Fla.: Annual Space Reviews, Inc.

Khang, Y.H. 2006. Relationship between childhood socio-economic position and mortality risk in adult males of the Korea Labour and Income Panel Study (KLIPS). *Public Health* 120 (8): 724-31.

Khoury-Kassabri, M., Benbenishty,R., Astor,R., and Zeira,A. 2004. The Contributions of Community, Family, and School Variables to Student Victimization. *American Journal of Community Psychology* 34 (3-4): 187-204.

Kickbusch, I., Wait,S., and Maag,D. 2006. *Navigating health: the role of health literacy.* London: Alliance for Health and the Future, International Longevity Centre-UK.

King, A., Wold,B., Tudor-Smith,C., and Harel,Y. 1996. *The health of youth. A cross-national survey.* WHO regional publications.European series 69 : 1-222.

Knesebeck, O.v.d., and Geyer,S. 2007. Emotional support, education and self-rated health in 22 European countries. *BMC Public Health* 7 (1): 272.

Knupfer, G. 1989. The prevalence in various social groups of eight different drinking patterns, from abstaining to frequent drunkenness: analysis of 10 U.S. surveys combined. *British*

Journal of Addiction 84 (11): 1305-18.

Kolarcik, P., Geckova,A.M., Orosova,O., van Dijk,J.,P., and Reijneveld,S.A. 2009. To what extent does socioeconomic status explain differences in health between Roma and non-Roma adolescents in Slovakia? *Social Science & Medicine* 68 (7): 1279-84.

Kolman, L., Noorderhaven,N.G., Hofstede,G., and Dienes,E. 2003. Cross-cultural differences in Central Europe. *Journal of Managerial Psychology* 18 (1): 76-88.

Kramer, M.S., Seguin,L., Lydon,J., and Goulet,L. 2000. Socio-economic disparities in pregnancy outcome: why do the poor fare so poorly? *Paediatric and Perinatal Epidemiology* 14 (3): 194-210.

Kristjansdottir, G., and Vilhjalmsson,R. 2001. Sociodemographic differences in patterns of sedentary and physically active behavior in older children and adolescents. *Acta Paediatrica* 90 (4): 429-35.

Kuehner, C. 2003. Gender differences in unipolar depression: an update of epidemiological findings and possible explanations. *Acta Psychiatrica Scandinavica* 108 (3): 163-74.

Kunst, A.E. 2009. Socioeconomic inequalities in health in Central and Eastern Europe: synthesis of results of eight new studies. *International Journal of Public Health* 54 (4): 197-200.

Kunst, A.E., and Mackenbach,J.P. 1994. The size of mortality differences associated with educational level in nine industrialized countries. *American Journal of Public Health* 84 (6): 932-7.

Laaksonen, M., Prattala,R., Helasoja,V., Uutela,A., and Lahelma,E. 2003. Income and health behaviours. Evidence from monitoring surveys among Finnish adults. *Journal of Epidemiology and Community Health* 57 (9): 711-7.

Laaksonen, M., Uutela,A., Vartiainen,E., Jousilahti,P., Helakorpi,S., and Puska,P. 1999. Development of smoking by birth cohort in the adult population in eastern Finland 1972-97. *Tobacco Control* 8 (2): 161-8.

Lahelma, E., Martikainen,P., Rahkonen,O., and Silventoinen,K. 1999. Gender differences in illhealth in Finland: patterns, magnitude and change. *Social Science & Medicine* 48 (1): 7-19.

LaVeist, T.A. 2005. Disentangling race and socioeconomic status: a key to understanding health inequalities. *Journal Of Urban Health* 82 (2): iii26-34.

Lawlor, D.A., Sterne,J.A.C., Tynelius,P., Davey Smith,G., and Rasmussen,F. 2006. Association of Childhood Socioeconomic Position with Cause-specific Mortality in a Prospective Record Linkage Study of 1,839,384 Individuals. *American Journal of Epidemiology* 164 (9): 907-15.

Leininger, L.J., and Ziol-Guest,K. 2008. Reexamining the effects of family structure on children's access to care: the single-father family. *Health Services Research* 43 (1): 117-33.

Leinsalu, M., Stirbu,I., Vagero,D., Kalediene,R., Kovacs,K., Wojtyniak,B., Wroblewska,W., Mackenbach,J.P., and Kunst,A.E. 2009. Educational inequalities in mortality in four Eastern European countries: divergence in trends during the post-communist transition from 1990 to 2000. *International Journal of Epidemiology* 38 (2): 512-25.

Lempers, J.D., Clark-Lempers,D., and Simons,R.L. 1989. Economic hardship, parenting, and distress in adolescence. *Child Development* 60 (1): 25-39.

Lett, H.S., Blumenthal,J.A., Babyak,M.A., Strauman,T.J., Robins,C., and Sherwood,A. 2005. Social support and coronary heart disease: Epidemiologic evidence and implications for treatment. *Psychosomatic medicine* 67 (6): 869-78.

Levin, K.A., Torsheim,T., Vollebergh,W., Richter,M., Davies,C.A., Schnohr,C.W., Due,P., and Currie,C. 2011. National Income and Income Inequality, Family Affluence and Life Satisfaction Among 13 year Old Boys and Girls: A Multilevel Study in 35 Countries. *Social Indicators Research* 104 (2): 179-94.

Lo, C.C., and Globetti,G. 1995. The effects of internal and external control factors on college students' marijuana use and cessation of use. *Journal of Drug Education* 25 (4): 357-77.

Luthar, S.S., and Latendresse,S.J. 2005. Children of the Affluent: Challenges to Well-Being. *Current Directions in Psychological Science* 14 (1): 49-53.

Mackenbach, J.P., I. Stirbu, A.J. Roskam, M. Schaap, G. Menvielle, M. Leinsalu, and A.E. Kunst. 2007. Socio-economic inequalities in mortality and morbidity: a cross-European perspective. In *Tackling Health Inequalities in Europe: An Integrated Approach.* Final Report., ed. The EUROTHINE project, 24-48. Rotterdam: Erasmus MC.

Mackenbach, J.P., Stirbu,I., Roskam,A.J., Schaap,M.M., Menvielle,G., Leinsalu,M., Kunst,A.E., and European Union Working Group on Socioeconomic Inequalities in Health. 2008. Socioeconomic inequalities in health in 22 European countries. *The New England Journal of Medicine* 358 (23): 2468-81.

Mackenbach, J., Kunst,A., Cavelaars,A., Groenhof,F., Geurts,J., Andersen,O., Bonte,J., et al. 1997. Socioeconomic inequalities in morbidity and mortality in western Europe. *Lancet* 349 (9066): 1655-9.

Madarasova Geckova, A., van Dijk,J.P., Honcariv,R., Groothoff,J.W., and Post,D. 2003. Influence of health risk behavior and socio-economic status on health of Slovak adolescents. *Croatian Medical Journal* 44 (1): 41-9.

Madarasova-Geckova, A. 2009. Can research contribute to the public's capacity for activities that reduce socioeconomic inequalities in health?. *International Journal of Public Health* 54 (4): 201-2.

Majer, I.M., Nusselder,W.J., Mackenbach,J.P., and Kunst,A.E. 2011. Socioeconomic inequalities in life and health expectancies around official retirement age in 10 Western-European countries. *Journal of Epidemiology and Community Health* 65 (11): 972-9.

Mannino, D.M. 2001. Predictors of Cotinine Levels in US Children: Data From the Third National Health and Nutrition Examination Survey. Chest 120 (3): 718-24.

Marcell, A.V., Klein,J.D., Fischer,I., Allan,M.J., and Kokotailo,P.K. 2002. Male adolescent use of health care services: where are the boys? *The Journal of Adolescent Health* 30 (1): 35-43.

Marmot, M.G., Bosma,H., Hemingway,H., Brunner,E., and Stansfeld,S. 1997. Contribution of job control and other risk factors to social variations in coronary heart disease incidence. *Lancet* 350 : 235-9.

Martens, M.F.J., Nijhuis,F.J.N., Van Boxtel, M. P. J., and Knottnerus,J.A. 1999. Flexible work schedules and mental and physical health. A study of a working population with non-traditional working hours. *Journal of Organizational Behavior* 20 (1): 35-46.

Matson-Koffman, D.M., Brownstein,J.N., Neiner,J.A., and Greaney,M.L. 2005. A site-specific literature review of policy and environmental interventions that promote physical activity and nutrition for cardiovascular health: what works? *American Journal of Health Promotion* 3 (19): 167-93.

Matthews, K.A., Gallo,L.C., and Taylor,S.E. 2010. Are psychosocial factors mediators of socioeconomic status and health connections? A progress report and blueprint for the future. *Biology of Disadvantage: Socioeconomic Status and Health* 1186 : 146-73.

Matthews, S., Manor,O., and Power,C. 1999. Social inequalities in health: are there gender differences? *Social Science & Medicine* 48 (1): 49-60.

Mayer, K. 2009. New Directions in Life Course Research. *Annual Review of Sociology* 35 (1): 413-33.

McClure, E.B., Monk,C.S., Nelson,E.E., Zarahn,E., Leibenluft,E., Bilder,R.M., Charney,D.S., Ernst,M., and Pine,D.S. 2004. A developmental examination of gender differences in brain engagement during evaluation of threat. *Biological Psychiatry* 55 (11): 1047-55.

McDowell, I., and Newell,C. 1996. *Measuring health: A guide to rating scales and questionnaires.* 2nd ed. New York: Oxford University Press.

McEwen, B.S., and Gianaros,P.J. 2010. Central role of the brain in stress and adaptation: Links to socioeconomic status, health, and disease. *Annals of the New York Academy of Sciences* 1186 : 190-222.

Mechanic, D., and Hansell,S. 1987. Adolescent competence, psychological well-being, and self-assessed physical health. *Journal of Health and Social Behavior* 28 (4): 364-74.

MEKN. 2007. The social determinants of health: Developing an evidence base for political action. *Final Report to World Health Organization Commission on the Social Determinants of Health.* Geneva: Measurement and Evidence Knowledge Network, World Health Organization.

Melchior, M., Berkman,L.F., Niedhammer,I., Chea,M., and Goldberg,M. 2003. Social relations and self-reported health: a prospective analysis of the French Gazel cohort. *Social Science & Medicine* 56 (8): 1817-30.

Mendle, J., Harden,K.P., Brooks-Gunn,J., and Graber,J.A. 2010. Development's tortoise and hare: pubertal timing, pubertal tempo, and depressive symptoms in boys and girls. *Developmental*

Psychology 46 (5): 1341-53.

Metcalfe, C., Davey Smith,G., Sterne,J.A., Heslop,P., Macleod,J., and Hart,C.L. 2005. Cause-specific hospital admission and mortality among working men: association with socioeconomic circumstances in childhood and adult life, and the mediating role of daily stress. *European Journal of Public Health* 15 (3): 238-44.

Mezuk, B., Rafferty,J.A., Kershaw,K.N., Hudson,D., Abdou,C.M., Lee,H., Eaton,W.W., and Jackson,J.S. in press. Reconsidering the Role of Social Disadvantage in Physical and Mental Health: Stressful Life Events, Health Behaviors, Race, and Depression. *American Journal of Epidemiology.*

Mickelson, K.D., and Kubzansky,L.D. 2003. Social distribution of social support: The mediating role of life events. *American Journal of Community Psychology* 32 (3-4): 265-81.

Middel, B., and van Sonderen,E. 2002. Statistical significant change versus relevant or important change in (quasi) experimental design: some conceptual and methodological problems in estimating magnitude of intervention-related change in health services research. *International journal of integrated care* 2 : e15.

Mikolajczyk, R.T., Brzoska,P., Maier,C., Ottova,V., Meier,S., Dudziak,U., Ilieva,S., and El Ansari,W. 2008. Factors associated with self-rated health status in university students: a cross-sectional study in three European countries. *BMC Public Health* 8 : 215.

Miles, D.R., van den Bree,M.B., Gupman,A.E., Newlin,D.B., Glantz,M.D., and Pickens,R.W. 2001. A twin study on sensation seeking, risk taking behavior and marijuana use. *Drug and alcohol dependence 62 (1): 57-68.*

Miller, D.S., and Miller,T.Q. 1997. A test of socioeconomic status as a predictor of initial marijuana use. *Addictive Behaviors* 22 (4): 479-89.

Miller, G.E. 2008. A functional genomic fingerprint of chronic stress in humans: blunted glucocorticoid and increased NF-kappaB signaling. *Biological Psychiatry* 64 : 263-5.

MONEE Project. 2000. Young People in Changing Societies. Florence: UNICEF.

Murberg, T.A., and Bru,E. 2004. Social support, negative life events and emotional problems among Norwegian adolescents. *School Psychology International* 25 (4): 387-403.

Mustard, C.A., and Etches,J. 2003. Gender differences in socioeconomic inequality in mortality. *Journal of Epidemiology and Community Health* 57 (12): 974-80.

Myers, D., Baer,W.C., and Choi,S. 1996. The Changing Problem of Overcrowded Housing. *Journal of the American Planning Association* 62 (1): 66-84.

Newcombe, R.G., and D.G. Altman. 2000. Proportions and their differences. In Statistics with confidence., eds. D. G. Altman, D. Machin, T. N. Bryant and M. J. Gardner, 45-56. Bristol: British Medical Journal Books.

Ochránková, D. 2006. *Základné štatistické ukazovatele o trhu práce v SR*. December 2006. [Basic statistical indicators of labor market in SR. December 2006.]. Bratislava: Central Office of Labour, Social Affairs and Family.

Ochránková, D., Országová,M., Nováková,H., and Komínek,R. 1998. *Prehľad vybraných ukazovateľov o nezamestnanosti.* [Overview of selected unemployment indicators]. Bratislava: Central Office of Labour, Social Affair and Family.

Olsson, C.A., Coffey,C., Toumbourou,J.W., Bond,L., Thomas,L., and Patton,G. 2003. Family risk factors for cannabis use: a population-based survey of Australian secondary school students. *Drug and Alcohol Review* 22 (2): 143-52.

Osler, M., Jorgensen,T., Davidsen,M., Gronbaek,M., Bronnum-Hansen,H., Madsen,M., Gerdes,U., and Schroll,M. 2001. Socioeconomic status and trends in alcohol drinking in the Danish MONICA population, 1982-92. *Scandinavian Journal of Public Health* 29 (1): 40-3.

Parent, A.S. 2003. The Timing of Normal Puberty and the Age Limits of Sexual Precocity: Variations around the World, Secular Trends, and Changes after Migration. *Endocrine Reviews* 24 (5): 668-93.

Park, N. 2005. A cross-cultural study of the levels and correlates of life satisfaction among adolescents. *Journal of Cross-cultural Psychology* 36 : 444-56.

Pietila, A.M., and Jarvelin,M.R. 1995. Health and social standing of young men viewed in light of information on their childhood and adolescence. *International journal of nursing studies* 32 (6): 545-55.

Pikhartova, J., Chandola,T., Kubinova,R., Bobak,M., Nicholson,A., and Pikhart,H. 2009. Neighbourhood socioeconomic indicators and depressive symptoms in the Czech Republic: a population based study. *International Journal of Public Health* 54 (4): 283-93.

Piko, B., and Fitzpatrick,K.M. 2001. Does class matter? SES and psychosocial health among Hungarian adolescents. *Social Science & Medicine* 53 (6): 817-30.

Piko, B.F. 2007. Self-perceived health among adolescents: the role of gender and psychosocial factors. *European Journal of Pediatrics* 166 (7): 701-8.

Piko, B.F., and Fitzpatrick,K.M. 2007. Socioeconomic status, psychosocial health and health behaviours among Hungarian adolescents. *European Journal of Public Health* 17 (4): 353-60.

Pitel, L., Geckova,A.M., van Dijk,J.P., and Reijneveld,S.A. 2010. Gender differences in adolescent health-related behaviour diminished between 1998 and 2006. *Public Health* 124 (9): 512-8.

Pitel, L., Geckova,A.M., van Dijk,J.P., and Reijneveld,S.A. 2011. Degree of urbanization and gender differences in substance use among Slovak adolescents. *International Journal of Public Health* 56, (6), 10.1007/s00038-010-0219-3.

Pollitt, R.A., Rose,K.M., and Kaufman,J.S. 2005. Evaluating the evidence for models of life course socioeconomic factors and cardiovascular outcomes: a systematic review. *BMC Public Health* 5 : 7.

Power, C., Hypponen,E., and Smith,G.D. 2005. Socioeconomic position in childhood and early adult life and risk of mortality: a prospective study of the mothers of the 1958 British birth cohort. *American Journal of Public Health* 95 (8): 1396-402.

Prattala, R., Hakala,S., Roskam,A.J., Roos,E., Helmert,U., Klumbiene,J., Van Oyen,H., Regidor,E., and Kunst,A.E. 2009. Association between educational level and vegetable use in nine European countries. *Public Health Nutrition* 12 (11): 2174-82.

Pristas, I., Bilic,M., Pristas,I., Voncina,L., Krcmar,N., Polasek,O., and Stevanovic,R. 2009. Health care needs, utilization and barriers in croatia--regional and urban-rural differences. *Collegium Antropologicum* 33 Suppl 1 : 121-30.

Raat, H., Wijtzes,A., Jaddoe,V.W.V., Moll,H.A., Hofman,A., and Mackenbach,J.P. 2011. The health impact of social disadvantage in early childhood; the Generation R study. *Early Human Development* 87 (11): 729-33.

Rahkonen, O., Arber,S., and Lahelma,E. 1995. Health inequalities in early adulthood: a comparison of young men and women in Britain and Finland. *Social Science & Medicine* 41 (2): 163-71.

Rahkonen, O., Berg,M.A., and Puska,P. 1992. The development of smoking in Finland from 1978 to 1990. *British Journal of Addiction* 87 (1): 103-10.

Rahkonen, O., and Lahelma,E. 1992. Gender, Social-Class and Illness among Young-People. *Social Science & Medicine* 34 (6): 649-56.

Ramsay, S.E., Whincup,P.H., Morris,R.W., Lennon,L.T., and Wannamethee,S.G. 2007. Are childhood socio-economic circumstances related to coronary heart disease risk? Findings from a population-based study of older men. *International Journal of Epidemiology* 36 (3): 560-6.

Ranjit, N. 2007. Socioeconomic position, race/ethnicity, and inflammation in the multi-ethnic study of atherosclerosis. *Circulation* 116 : 2383-90.

Rasbash, J., Charlton,C., Browne,W.J., Healy,M., and Cameron,B. 2005. MLwiN. Vol. 2.02.

Reevy, G.M., and Maslach,C. 2001. Use of social support: Gender and personality differences. *Sex Roles* 44 (7-8): 437-59.

Reijneveld, S.A., Crone,M.R., Verhulst,F.C., and Verloove-Vanhorick,S.P. 2003. The effect of a severe disaster on the mental health of adolescents: a controlled study. *Lancet* 362 (9385): 691-6.

Repetti, R.L. 1989. Effects of Daily Workload on Subsequent Behavior during Marital Interaction - the Roles of Social Withdrawal and Spouse Support. *Journal of Personality and Social Psychology* 57 (4): 651-9.

Repetti, R.L., Taylor,S.E., and Seeman,T.E. 2002. Risky families: Family social environments and the mental and physical health of offspring. *Psychological Bulletin* 128 (2): 330-66.

Richter, M., Vereecken,C.A., Boyce,W., Maes,L., Gabhainn,S.N., and Currie,C.E. 2009. Parental

occupation, family affluence and adolescent health behaviour in 28 countries. *International Journal of Public Health* 54 (4): 203-12.

Romelsjo, A., and Lundberg,M. 1996. The changes in the social class distribution of moderate and high alcohol consumption and of alcohol-related disabilities over time in Stockholm County and in Sweden. *Addiction* 91 (9): 1307-23.

Rootman, I., and D. Gordon-El-Bihbety. 2008. *A Vision for a Health Literate Canada*: Report of the Expert Panel on Health Literacy. Ottawa: Canadian Public Health Association.

Rouse, C.E., and Barrow,L. 2006. U.S. Elementary and Secondary Schools: Equalizing Opportunity or Replicating the Status Quo? *The Future of Children* 16 (2): 99-123.

Royo-Bordonada, M.A., Cid-Ruzafa,J., Martin-Moreno,J.M., and Guallar,E. 1997. Drug and alcohol use in Spain: consumption habits, attitudes and opinions. *Public Health* 111 (5): 277-84.

Ryff, C.D., B.H. Singer, and K.A. Palmersheim. 2004. Social Inequalities in Health and Well-Being: The Role of Relational and Religious Protective Factors. In H*ow Healthy are We?: A National Study of Well-Being at Midlife.*, eds. O. G. Brim, C. D. Ryff and R. C. Kessler, 90-124. Chicago: University of Chicago Press.

Sadava, S.W., O'connor,R., and McCreary,D.R. 2000. Employment status and health in young adults: economic and behavioural mediators? *Journal of Health Psychology* 5 (4): 549-60.

Salonna, F., Middel,B., Sleskova,M., Geckova,A.M., Reijneveld,S.A., Groothoff,J.W., and van Dijk,J.P. 2008a. Deterioration is not the only prospect for adolescents' health: Improvement in self-reported health status among boys and girls from age 15 to age 19. *Croatian Medical Journal* 49 (1): 66-74.

Salonna, F., van Dijk,J.P., Geckova,A.M., Sleskova,M., Groothoff,J.W., and Reijneveld,S.A. 2008b. Social inequalities in changes in health-related behaviour among Slovak adolescents aged between 15 and 19: A longitudinal study. *BMC Public Health* 8 .

Schmied, V., and Tully,L. 2009. *Effective strategies and interventions for adolescents in a child protection context : literature review.* PANDORA electronic collection. Ashfield, N.S.W.: NSW Dept. of Community Services.

Schoon, I., and Parsons,S. 2002. Teenage aspirations for future careers and occupational outcomes. *Journal of Vocational Behavior* 60 (2): 262-88.

Schraedley, P.K., Gotlib,I.H., and Hayward,C. 1999. Gender differences in correlates of depressive symptoms in adolescents. *The Journal of Adolescent Health* 25 (2): 98-108.

Scragg, R., Laugesen,M., and Robinson,E. 2002. Cigarette smoking, pocket money and socioeconomic status: results from a national survey of 4th form students in 2000. *The New Zealand Medical Journal* 115 (1158): U108.

Sebena, R., Orosova,O., Mikolajczyk,R.T., and van Dijk,J.P. 2011. Selected sociodemographic factors and related differences in patterns of alcohol use among university students in Slovakia. *BMC Public Health* 11 (1): 849.

Seeman, T., Epel,E., Gruenewald,T., Karlamangla,A., and McEwen,B.S. 2010. Socio-economic differentials in peripheral biology: Cumulative allostatic load. *Biology of Disadvantage: Socioeconomic Status and Health* 1186 : 223-39.

Segerstrom, S.C. 2004. Psychological stress and the human immune system: a meta-analytic study of 30 years of inquiry. *Psychological Bulletin* 130 : 601-30.

Settertobulte, W., and Kolip,P. 1997. Gender-specific factors in the utilization of medical services during adolescence. *Journal of Adolescence* 20 (1): 121-32.

Silbereisen, R.K., M. Reitzle, and L. Juang. 2002. Time and change: psychosocial transitions in German young adults1991 to 1996. In *Paths to successful development: personality in the life course.*, eds. Lea Pulkkinen, Avshalom Caspi, 227-254. Cambridge, U.K.: Cambridge University Press.

Simeoni, M.C., Sapin,C., Antoniotti,S., and Auquier,P. 2001. Health-related quality of life reported by French adolescents: a predictive approach of health status? *The Journal of Adolescent Health* 28 (4): 288-94.

Skodova, Z., Nagyova,I., van Dijk,J.P., Sudzinova,A., Vargova,H., Rosenberger,J., Middel,B., Studencan,M., and Reijneveld,S.A. 2009. Socioeconomic inequalities in quality of life and psychological outcomes among cardiac patients. *International Journal of Public Health* 54

(4): 233-40.

Sleskova, M., Salonna,F., Geckova,A.M., Nagyova,I., Stewart,R.E., van Dijk,J.P., and Groothoff,J.W. 2006. Does parental unemployment affect adolescents' health? *Journal of Adolescent Health* 38, (5), 10.1016/j.jadohealth.2005.03.021.

Sleskova, M., Salonna,F., Geckova,A.M., van Dijk,J.P., and Groothoff,J.W. 2005. Health status among young people in Slovakia: comparisons on the basis of age, gender and education. *Social Science & Medicine* 61 (12): 2521-7.

Sleskova, M., Tuinstra,J., Geckova,A.M., van Dijk,J.P., Salonna,F., Groothoff,J.W., and Reijneveld,S.A. 2006. Influence of parental employment status on Dutch and Slovak adolescents' health. *BMC Public Health* 6 .

Smith, J.P. 1999. Healthy bodies and thick wallets: the dual relationship between health and economic status. *The Journal of Economic Perspectives* 13 : 145-66.

SPSS Inc. 2007. *SPSS Base 16.0 User's Guide*. Chicago IL: SPSS Inc.

Stansfeld, S.A., Head,J., Fuhrer,R., Wardle,J., and Cattell,V. 2003. Social inequalities in depressive symptoms and physical functioning in the Whitehall II study: exploring a common cause explanation. *Journal of Epidemiology and Community Health* 57 : 361-7.

Starfield, B., Riley,A.W., Witt,W.P., and Robertson,J. 2002. Social class gradients in health during adolescence. *Journal of Epidemiology and Community Health* 56 (5): 354-61.

Steptoe, A., Wardle,J., Cui,W., Bellisle,F., Zotti,A.M., Baranyai,R., and Sanderman,R. 2002. Trends in smoking, diet, physical exercise, and attitudes toward health in European university students from 13 countries, 1990-2000. *Preventive Medicine* 35 (2): 97-104.

Stirbu, I., Kunst,A.E., Bopp,M., Leinsalu,M., Regidor,E., Esnaola,S., Costa,G., et al. 2010. Educational inequalities in avoidable mortality in Europe. *Journal of Epidemiology and Community Health* 64, (10), 10.1136/jech.2008.081737.

Stirbu, I., Kunst,A.E., Mielck,A., and Mackenbach,J.P. 2011. Inequalities in utilisation of general practitioner and specialist services in 9 European countries. *BMC Health Services Research* 11 : 288.

Stock, C., Wille,L., and Kramer,A. 2001. Gender-specific health behaviors of German university students predict the interest in campus health promotion. *Health Promotion International* 16 (2): 145-54.

Strand, B.H., and Kunst,A. 2006. Childhood Socioeconomic Position and Cause-specific Mortality in Early Adulthood. *American Journal of Epidemiology* 165 (1): 85-93.

Stronks, K., van de Mheen,H., van den Bos,J., and Mackenbach,J.P. 1995. Smaller socioeconomic inequalities in health among women: the role of employment status. *International Journal of Epidemiology* 24 (3): 559-68.

Sweeting, H., and West,P. 1994. The Patterning of Life Events in Mid-Adolescence to Late Adolescence - Markers for the Future. *Journal of Adolescence* 17 (3): 283-304.

Sweeting, H., and West,P. 2001. Social class and smoking at age 15: the effect of different definitions of smoking. *Addiction* 96 (9): 1357-9.

Taylor, S.E., Klein,L.C., Lewis,B.P., Gruenewald,T.L., Gurung,R.A.R., and Updegraff,J.A. 2000. Biobehavioral responses to stress in females: Tend-and-befriend, not fight-or-flight. *Psychological Review* 107 (3): 411-29.

Taylor, S.E., and Seeman,T.E. 1999. Psychosocial resources and the SES-health relationship. *Annals of the New York Academy of Sciences* 896 : 210-25.

Taylor, S.E., Eisenberger,N.I., Saxbe,D., Lehman,B.J., and Lieberman,M.D. 2006. Neural Responses to Emotional Stimuli Are Associated with Childhood Family Stress. *Biological Psychiatry* 60 (3): 296-301.

Telama, R., and Yang,X. 2000. Decline of physical activity from youth to young adulthood in Finland. *Medicine and Science in Sports and Exercise* 32 (9): 1617-22.

Torsheim, T., Currie,C., Boyce,W., Kalnins,I., Overpeck,M., and Haugland,S. 2004. Material deprivation and self-rated health: a multilevel study of adolescents from 22 European and North American countries. *Social Science & Medicine* 59 (1): 1-12.

Troxel, W.M., and Matthews,K.A. 2004. What Are the Costs of Marital Conflict and Dissolution to Children's Physical Health? *Clinical Child and Family Psychology Review* 7 (1): 29-57.

Tschann, J.M., Adler,N.E., Irwin,C.E.,Jr, Millstein,S.G., Turner,R.A., and Kegeles,S.M. 1994. Initiation of substance use in early adolescence: the roles of pubertal timing and emotional distress. *Health Psychology* 13 (4): 326-33.

Tuinstra, J., Groothoff,J.W., Van den Heuvel,W.J.A., and Post,D. 1998. Socio-economic differences in health risk behavior in adolescence: Do they exist? *Social Science & Medicine* 47 (1): 67-74.

Turner, J.R., and Marino,F. 1994. Social support and social structure: a descriptive epidemiology. *Journal of Health and Social Behavior* 35 : 193-212.

Uchino, B. 2009. What a lifespan approach might tell us about why distinct measures of social support have differential links to physical health. *Journal of Social and Personal Relationships* 26 (1): 53-62.

Uitenbroek, D.G., Kerekovska,A., and Festchieva,N. 1996. Health lifestyle behaviour and socio-demographic characteristics. A study of Varna, Glasgow and Edinburgh. *Social Science & Medicine* 43 (3): 367-77.

Umberson, D., Crosnoe,R., and Reczek,C. 2010. Social Relationships and Health Behavior Across Life Course. *Annual Review of Sociology* 36 : 139-57.

Unger, J.B., McAvay,G., Bruce,M.L., Berkman,L., and Seeman,T. 1999. Variation in the impact of social network characteristics on physical functioning in elderly persons: MacArthur Studies of Successful Aging. *The Journals of Gerontology* 54 (5): S245-51.

Ustun, T.B. 2000. Cross-national epidemiology of depression and gender. *The Journal of Gender-Specific Medicine* 3 (2): 54-8.

Utter, J., Neumark-Sztainer,D., Jeffery,R., and Story,M. 2003. Couch potatoes or french fries: are sedentary behaviors associated with body mass index, physical activity, and dietary behaviors among adolescents? Journal of the American Dietetic Association 103 (10): 1298-305.

Van Der Horst, K., Paw,M.J., Twisk,J.W., and Van Mechelen,W. 2007. A brief review on correlates of physical activity and sedentariness in youth. *Medicine and Science in Sports and Exercise* 39 (8): 1241-50.

van der Velden, J., Abrahamse,H.P.H., Donker,G., van der Steen,J., van Sonsbeek,J.L.A., and van den Bos,G.A.M. 1998. What do health interview surveys tell us about the prevalences of somatic chronic diseases? A study into concurrent validity. *European Journal of Public Health* 8 (1): 52-8.

van Mechelen, W., Twisk,J.W., Post,G.B., Snel,J., and Kemper,H.C. 2000. Physical activity of young people: the Amsterdam Longitudinal Growth and Health Study. *Medicine and Science in Sports and Exercise* 32 (9): 1610-6.

van Oort, F.V., Greaves-Lord,K., Ormel,J., Verhulst,F.C., and Huizink,A.C. 2011. Risk indicators of anxiety throughout adolescence: the TRAILS study. *Depression and Anxiety* 28 (6): 485-94.

Veselska, Z., Madarasova Geckova,A., Reijneveld,S.A., and van Dijk,J.P. 2011. Socio-economic status and physical activity among adolescents: the mediating role of self-esteem. *Public Health* 125 (11): 763-8.

Vilhjalmsson, R., and Kristjansdottir,G. 2003. Gender differences in physical activity in older children and adolescents: the central role of organized sport. *Social Science & Medicine* 56 (2): 363-74.

Vilhjalmsson, R., and Thorlindsson,T. 1998. Factors related to physical activity: a study of adolescents. *Social Science & Medicine* 47 (5): 665-75.

Wade, T.J., Cairney,J., and Pevalin,D.J. 2002. Emergence of gender differences in depression during adolescence: national panel results from three countries. *Journal of the American Academy of Child and Adolescent Psychiatry* 41 (2): 190-8.

Wade, T.J., Pevalin,D.J., and Vingilis,E. 2000. Revisiting student self-rated physical health. *Journal of Adolescence* 23 (6): 785-91.

Waldfogel, J., Craigie,T., and Brooks-Gunn,J. 2010. Fragile Families and Child Wellbeing. *Future of Children* 20 (2): 87-112.

Wallace, C., Pichler,F., and Haerpfer,C. 2012. Changing Patterns of Civil Society in Europe and America 1995-2005 Is Eastern Europe Different? *East European Politics Societies* 26 (1): 3-19.

Wardle, J., Jarvis,M.J., Steggles,N., Sutton,S., Williamson,S., Farrimond,H., Cartwright,M.,

and Simon,A.E. 2003. Socioeconomic disparities in cancer-risk behaviors in adolescence: baseline results from the Health and Behaviour in Teenagers Study (HABITS). *Preventive Medicine* 36 (6): 721-30.

Ware, J.E., and Sherbourne,C.D. 1992. The MOS 36-Item Short-Form Health Survey (SF-36) . I. Conceptual-Framework and Item Selection. *Medical Care* 30 (6): 473-83.

Waters, E., Wake,M., Toumbourou,J., Wright,M., and Salmon,L. 1999. Prevalence of emotional and physical health concerns amongst young people in Victoria. *Journal of Paediatrics and Child Health* 35 (1): 28-33.

West, P. 1988. Inequalities? Social class differentials in health in British youth. *Social Science & Medicine* 27 (4): 291-6.

West, P. 1997. Health inequalities in the early years: Is there equalisation in youth? *Social Science & Medicine* 44 (6): 833-58.

West, P., and Sweeting,H. 2004. Evidence on equalisation in health in youth from the West of Scotland. *Social Science & Medicine* 59 (1): 13-27.

Weyers, S., Dragano,N., Moebus,S., Beck,E., Stang,A., Moehlenkamp,S., Joeckel,K.H., Erbel,R., and Siegrist,J. 2008. Low socio-economic position is associated with poor social networks and social support: results from the Heinz Nixdorf Recall Study. *International Journal for Equity in Health* 7 : 13.

Weyers, S., Dragano,N., Moebus,S., Beck,E., Stang,A., Moehlenkamp,S., Joeckel,K.H., Erbel,R., and Siegrist,J. 2010. Poor social relations and adverse health behaviour: stronger associations in low socioeconomic groups? *International Journal of Public Health* 55 (1): 17-23.

Whitehead, M. 1992. The Concepts and Principles of Equity and Health. *International Journal of Health Services* 22 (3): 429-45.

WHO. Health for all database. in WHO Regional Office for Europe [database online]. Copenhagen, 2012 [cited May/23 2012]. Available from http://data.euro.who.int/hfadb/.

Wichstrøm, L., and Pedersen,W. 2001. Use of anabolic-androgenic steroids in adolescence: winning, looking good or being bad? *Journal of Studies on Alcohol* 62 (1): 5-13.

Wight, R.G., Sepulveda,J.E., and Aneshensel,C.S. 2004. Depressive symptoms: how do adolescents compare with adults? *The Journal of Adolescent Health* 34 (4): 314-23.

Williams, G.D., and Debakey,S.F. 1992. Changes in levels of alcohol consumption: United States, 1983-1988. *British Journal of Addiction* 87 (4): 643-8.

Wood, J., and Repetti,R.L. 1997. Effects of daily stress at work on mothers' interactions with preschoolers. *Journal of Family Psychology* 11 (1): 90-108.

Wyke, S., Hunt,K., and Ford,G. 1998. Gender differences in consulting a general practitioner for common symptoms of minor illness. *Social Science & Medicine* 46 (7): 901-6.

Yang, M., Eldridge,S., and Merlo,J. 2009. Multilevel survival analysis of health inequalities in life expectancy. *International Journal For Equity In Health* 8 : 31-.

Yang, Y., and Land,K.C. 2006. A Mixed Models Approach To the Age-Period-Cohort Analysis of Repeated Cross-Section Surveys, With an Application To Data on Trends in Verbal Test Scores. *Sociological Methodology* 36 (1): 75-97.

Yarcheski, A., and Mahon,N.E. 1999. The moderator-mediator role of social support in early adolescents. *Western Journal of Nursing Research* 21 (5): 685-98.

Zhu, X., and Lee,C. 2008. Walkability and Safety Around Elementary Schools. *American Journal of Preventive Medicine* 34 (4): 282-90.

Summary

So far, research on inequalities in health has mostly focused on deprivation in early life and adulthood. However, studying adolescents' health can help to understand the origin/etiology of socio-economic health inequalities. The present study intends to make a contribution to the relatively neglected field of socioeconomic inequalities in adolescence. Firstly, changes in health status, assessed with subjective health indicators in a cohort of 15-year-old adolescents who were followed-up to the age of 19; secondly, the socioeconomic differences in changes of self-rated health (SRH) in the same cohort; and thirdly, the period effect of patterns of SRH comparing cohorts of Slovak adolescents from 1998 and from 2006. As health related behaviours contribute to higher morbidity as well as mortality regarding a range of diseases, as a fourth step we explored changes of health related behaviours contribute in a cohort of 15-year-old adolescents followed-up to the age of 19. Finally, it was assessed whether social support from mother, father and friend mediates or moderates socioeconomic differences in SRH among adolescents. Social support from parents and peers is an important factor which can protect health of young people in the context of their socioeconomic position.

The research samples, the measures and statistical analyses used in this thesis are briefly described in Chapter 2.

Chapter 3 describes the health status of young people in Slovakia using self-reported health indicators. It presents the results of a longitudinal study on the direction and magnitude of changes of the health status in a cohort of 15-year-old adolescents who were followed-up to the age of 19. Both boys and girls reported a significant deterioration in vitality and mental health, while only boys re¬ported deterioration in SRH. However, we identified not only deterioration, but also improvement and stability in SRH among boys and girls. Significantly more girls than boys reported an improvement in mental health and vitality, while more boys than girls reported deterioration in vitality.

Adolescence is a time in which life-style and health-related behaviours are being established. Research efforts mainly aim at studying young adolescents at risk of get¬ting involved in smoking, and drug and alcohol use, which may negatively affect health. However, it could also be extended to a health-protective lifestyle as the improvement in health as observed may also be related to protective behaviours. Chapter 4 deals with socioeconomic differences in changes of SRH in a cohort of 15-year-old adolescents who were followed-up to the age of 19. It assesses whether changes of SRH differed by educational level of respondents, current occupational status of respondents, and educational level and occupational status of parents. Socioeconomic differences in SRH of males aged 15 were very shallow and this pattern remained stable until their 19th year of life. The traditional gradient of socioeconomic differences (the lower the socioeconomic position, the higher the prevalence of poor health) in SRH among females became more distinct from age 15 to age 19.

Chapter 5 describes the differences in socioeconomic inequalities in SRH among cohorts of Slovak adolescents in 1998 and in 2006. It presents prevalence rates for reporting poor health by educational level of parents. Secondly the magnitudes

of socioeconomic differences in health were measured by indexes of dissimilarity. Traditional socioeconomic gradients in SRH were found in both males and females in 1998 and 2006 although they were statistically significant only for females. We found a trend of decreasing indexes of dissimilarity from 1998 to 2006. The trend was more visible among females than among males. Our findings confirm period effects regarding socioeconomic differences in health, probably due to a shift in social, cultural, economic and physical environment. This might reflect societal stabilization.

Chapter 6 explores changes in health-related behaviour in a cohort of adolescents between ages 15 and 19, overall and by socioeconomic position. It explores changes of in adolescents' smoking, alcohol use, experience with marijuana and lack of physical exercise with regard to their current education level and employment status, and the highest education level and highest occupational status of their parents. We found an increase in unhealthy health-related behaviour during adolescence. Among males, the most obvious socioeconomic gradient was found in smoking, both at age 15 and at 19. Changes in socioeconomic differences in health-related behaviour were more apparent among females. Although at age 15, almost no socioeconomic differences in health-related behaviour were found; at age 19 differences were found for almost all socioeconomic indicators. Among males, only traditional socioeconomic gradients were found (the lower the socioeconomic position, the higher the prevalence of potentially harmful health-related behaviour), while among females reverse socioeconomic gradients were found too.

Chapter 7 deals with social support and its role in socioeconomic differences in SRH among adolescents. We explore whether social support from the father, mother and friends mediates or moderates the association between socioeconomic position and SRH among adolescents. Social support from the father mediated the association between family affluence and SRH among both males and females and the association between financial strain and SRH among males only. No moderating effect of social support on socioeconomic differences in SRH was found. Even if the importance of social support from the mother is often emphasised in stressful life situations, paternal involvement seems to also have the potential to mediate socioeconomic differences in health. A father and mother could alternate or complement each other in providing their children social support, and active parental involvement during adolescence seems to have the potential to affect the SRH of their offspring.

In the final chapter of this thesis the main results are discussed at a more general level and embedded in the context of socio-economic health inequalities. The problems of change in socioeconomic differences in health and health related behaviour from age 15 to 19 are discussed. Emphasis is also laid on the comparison of different cohorts of adolescents in different periods on the basis of socioeconomic differences in health. In addition, the role of social support in socioeconomic differences in health during adolescence is discussed. Next, the most important strengths and limitations are reviewed. Also recommendations for further research are made. Longitudinal studies may be used, with shorter time intervals and covering also childhood and adulthood to determine factors that may explain changing mental and physical health and their (causal) paths. In the recommendations for practice, among others, the importance of promotion of health-preserving activities among females from lower socioeconomic positions is discussed.

Samenvatting

Onderzoek naar ongelijkheid in gezondheid was tot nu toe vooral gericht op achterstand in de vroege jeugd en de volwassenheid. Echter, het bestuderen van de gezondheid van adolescenten kan helpen om de oorsprong / oorzaak van sociaal-economische gezondheidsverschillen beter te begrijpen. Dit proefschrift is bedoeld om een bijdrage te leveren aan het relatief verwaarloosde gebied van sociaal-economische gezondheidsverschillen in de adolescentie. Veranderingen in de gezondheidstoestand gemeten met subjectieve gezondheidsindicatoren werden onderzocht in een cohort van 15-jarige jongeren die werden gevolgd tot de leeftijd van 19 jaar. Vervolgens werden sociaal-economische verschillen in de mate van verandering van de ervaren gezondheid gemeten in de dezelfde groep. Ook werden de patronen van ervaren gezondheid van cohorten Slowaakse jongeren uit 1998 en 2006 vergeleken, om periode-effecten in kaart te brengen. Omdat gezondheidsgerelateerd gedrag mede verantwoordelijk is voor een hogere morbiditeit en mortaliteit vanwege een reeks van ziekten, zijn als vierde stap de veranderingen van relevant gezondheidsgerelateerd gedrag verkend in een cohort van 15-jaar oude adolescenten die gevolgd werden tot de leeftijd van 19 jaar. Tenslotte werd nagegaan of sociale steun van moeder, vader en vrienden een mediërende of modificerende rol vervult ten aanzien van sociaal-economische verschillen in de ervaren gezondheid van adolescenten. Het blijkt dat sociale steun van ouders en leeftijdgenoten een belangrijke factor is in de bescherming van de gezondheid van jonge mensen gegeven hun sociaal-economische positie.

De in dit proefschrift gebruikte steekproeven, meetinstrumenten en statistische analyses worden kort beschreven in hoofdstuk 2.

In Hoofdstuk 3 wordt de gezondheidstoestand van jongeren in Slowakije met behulp van zelf-gerapporteerde gezondheidsindicatoren beschreven. De resultaten worden hier gepresenteerd van een longitudinaal onderzoek naar de richting en grootte van de veranderingen in de gezondheidstoestand in een cohort van 15-jarige jongeren die werden gevolgd tot de leeftijd van 19 jaar. Zowel jongens als meisjes rapporteerden een significante verslechtering van hun vitaliteit en geestelijke gezondheid, terwijl jongens alleen een verslechtering van hun ervaren gezondheid meldden. Echter, we constateerden niet alleen achteruitgang, maar ook verbetering en stabiliteit in ervaren gezondheid onder jongens en meisjes. Significant meer meisjes dan jongens rapporteerden een verbetering van hun geestelijke gezondheid en vitaliteit, terwijl meer jongens dan meisjes een verslechtering van hun vitaliteit rapporteerden. De adolescentie is een periode waarin leefwijzen en gezondheidsgerelateerd gedrag voor de toekomst vorm krijgen. Onderzoeksinspanningen zijn voornamelijk gericht op het bestuderen van de factoren die de kans vergroten dat jongeren betrokken raken bij roken, drugs- en alcoholgebruik. Echter, aandacht verdient ook onderzoek naar een gezondheidsbeschermende levensstijl, omdat de waargenomen gezondheidsverbetering ook gerelateerd kan zijn aan gezondheidsbeschermend gedrag.

Hoofdstuk 4 richt zich op sociaal-economische verschillen in de verandering van de ervaren gezondheid in een cohort van 15-jarige jongeren die werden gevolgd tot de leeftijd van 19 jaar. Onderzocht is of veranderingen van ervaren gezondheid

verschilden naar het opleidingsniveau en huidige beroep van de respondenten, en het opleidingsniveau en beroep van de ouders. We vonden geen veranderingen in de sociaal-economische gradiënten in ervaren gezondheid bij de groep adolescenten van 15 tot 19 jaar wat betreft deze vier indicatoren voor sociaal-economische positie. Sociaal-economische verschillen in de ervaren gezondheid van de jongens van 15 jaar waren erg klein en dit patroon bleef stabiel tot hun 19e levensjaar. De traditionele gradiënt van sociaal-economische verschillen in de ervaren gezondheid was bij meisjes meer uitgesproken op hun 19e vergeleken met hun 15e levensjaar.

In Hoofdstuk 5 worden de verschillen in sociaal-economische ongelijkheid in ervaren gezondheid onder cohorten van de Slowaakse jongeren uit 1998 en 2006 beschreven. Eerst worden prevalentiecijfers gepresenteerd met betrekking tot het rapporteren van een slechte ervaren gezondheid naar het opleidingsniveau en huidige beroep van de respondenten, en het opleidingsniveau en beroep van hun ouders. Vervolgens is de omvang van de sociaal-economische verschillen in ervaren gezondheid gemeten door middel van indexen van ongelijkheid. De traditionele sociaal-economische gradiënten (hoe lager de sociaal-economische positie, des te hoger de prevalentie van slechte gezondheid) in ervaren gezondheid werd zowel onder jongens als meisjes in 1998 en 2006 gevonden ook al waren ze alleen statistisch significant voor meisjes. We vonden een trend van dalende indexen van ongelijkheid over de periode 1998-2006. De trend was meer zichtbaar bij meisjes dan bij jongens. Onze bevindingen bevestigen het bestaan van periode-effecten ten aanzien van sociaal-economische verschillen in gezondheid, waarschijnlijk vanwege veranderingen in de sociale, culturele, economische en fysieke omgeving. Dit zou een reflectie kunnen zijn van een maatschappelijke stabilisatie.

In Hoofdstuk 6 worden veranderingen in gezondheidsgerelateerd gedrag in een cohort van jongeren op de leeftijd van 15 en 19 jaar gerapporteerd, overall en per sociaal-economische positie. Veranderingen bij adolescenten met betrekking tot roken, alcoholgebruik, ervaring met marihuana en gebrek aan lichamelijke oefening worden beschreven in relatie tot hun huidige opleidingsniveau en arbeidspositie, en het hoogste opleidingsniveau en de hoogste beroepsstatus van hun ouders. We vonden een toename in ongezond gezondheidsgerelateerd gedrag tijdens de adolescentie. Onder jongens is de duidelijke sociaal-economische gradiënt het meest duidelijk bij roken, zowel op de leeftijd van 15 als van 19 jaar. Veranderingen in sociaal-economische verschillen in gezondheidsgerelateerd gedrag waren meer zichtbaar bij meisjes. Bij hen werden op 15-jarige leeftijd bijna geen sociaal-economische verschillen in gezondheidsgerelateerd gedrag gevonden, maar op 19-jarige leeftijd werden verschillen gevonden voor bijna alle sociaal-economische indicatoren. Onder jongens werden alleen de traditionele sociaal-economische gradiënten gevonden (hoe lager de sociaal-economische positie, hoe hoger de prevalentie van potentieel schadelijke gezondheidsgerelateerd gedrag), terwijl onder meisjes ook omgekeerde sociaal-economische gradiënten werden gevonden.

Hoofdstuk 7 handelt over sociale steun en de rol ervan bij de sociaal-economische verschillen in ervaren gezondheid bij adolescenten. We onderzochten of sociale steun van de vader, moeder en vrienden het verband tussen sociaal-economische positie en ervaren gezondheid bij adolescenten medieert of modereert. Sociale steun van de vader medieert de relatie tussen de gezinswelstand en ervaren gezondheid bij zowel jongens en meisjes en het verband tussen ervaren financiële problemen en ervaren gezondheid alleen bij jongens. Een modererend effect van sociale steun op sociaal-economische verschillen in de ervaren gezondheid werd niet

gevonden. Hoewel het belang van sociale steun van de moeder in stressvolle situaties vaak benadrukt wordt, lijkt vaderlijke betrokkenheid toch ook de potentie te hebben om sociaal-economische gezondheidsverschillen te mediëren. Een vader en moeder zouden elkaar kunnen afwisselen of aanvullen in het geven van sociale steun aan hun kinderen; de actieve betrokkenheid van de ouders lijkt de ervaren gezondheid van hun kinderen te kunnen beïnvloeden.

In het laatste hoofdstuk van dit proefschrift worden de belangrijkste resultaten op een meer algemeen niveau besproken en geplaatst binnen de context van sociaal-economische gezondheidsverschillen. De problematiek van veranderingen in sociaal-economische gezondheidsverschillen en gezondheidsgerelateerd gedrag vanaf 15 jaar tot 19 jaar wordt besproken. Ook wordt stil gestaan bij de vergelijking van verschillende cohorten jongeren in verschillende periodes aan de hand van sociaal-economische gezondheidsverschillen. Daarnaast wordt de rol van sociale steun bij sociaal-economische gezondheidsverschillen tijdens de adolescentie besproken. Vervolgens wordt op de belangrijkste sterke punten en beperkingen van het onderzoek ingegaan. Tot slot worden aanbevelingen voor vervolgonderzoek gedaan. Longitudinaal onderzoek met korte meetintervallen dat de kindertijd en de volwassenheid omvat kan worden gebruikt om factoren te identificeren die bij kunnen dragen aan de verklaring van de verandering van de geestelijke en lichamelijke gezondheid en de causale paden die daartoe leiden. In de aanbevelingen voor de praktijk wordt onder meer het belang besproken van bevordering van gezondheidsbehoudende activiteiten bij meisjes met een lagere sociaal-economische positie.

Zhrnutie

Doterajší výskum v oblasti nerovností v zdraví sa zväčša zameriaval na depriváciu v detstve a dospelosti. Štúdium zdravia adolescentov môže byť nápomocné pre pochopenie pôvodu/etiológie socio-ekonomických rozdielov v zdraví. Zámerom tejto štúdie je preto príspevok v relatívne zanedbávanej oblasti výskumu sociálno-ekonomických nerovností v zdraví počas adolescencie. V prvom kroku sa štúdia zameriava na zmeny v subjektívnom zdraví kohorty 15 ročných adolescentov sledovaných do 19. roku života. Následne sleduje aj socio-ekonomické nerovnosti v zmene subjektívneho zdravia v tej istej kohorte. V ďalšom kroku bol porovnávaný charakter nerovností v subjektívnom zdraví v dvoch kohortách adolescentov z roku 1998 a 2006. Kedže so zdravím súvisiace správanie prispieva k vyššej morbidite, ako aj mortalite u viacerých ochorení, zamerali sme na zmeny v takomto správaní od 15. do 19. roku života. Sociálna opora od rodičov a rovesníkov je dôležitým ochranným faktorom zdravia adolescentov v kontexte ich socio-ekonomickej pozície.V závere bolo posudzované, či sociálna opora od otca, matky a priateľov je mediátorom alebo moderátorom socio-ekonomických nerovností v zdraví.

Informácie o výskumných vzorkách, indikátoroch a štatistických metódach použitých v tejto práci sú popísané v Kapitole 2.

Kapitola 3 popisuje subjektívnymi indikátormi meraný zdravotný stav mladých ľudí na Slovensku. Prezentované sú výsledky longitudinálnej štúdie o smere a veľkosti zmien v zdravotnom stave v kohorte 15 ročných adolescentov sledovaných do 19. roku života. Chlapci, ako aj dievčatá vykazovali významné zhoršenie v škálach vitality a duševného zdravia, kým iba chlapci vykazovali zhoršenie subjektívneho zdravia. Avšak, popri zhoršení bolo zaznamenané i zlepšenie a stabilita subjektívneho zdravia u chlapcov a dievčat. Významne viac dievčat ako chlapcov vykazovalo zlepšenie duševného zdravia a vitality, kým významne viac chlapcov ako dievčat vykazovalo zhoršenie vitality. Adolescencia je obdobím, počas ktorého sa upevňuje životný štýl a so zdravím súvisiace správanie. Výskumy sa zväčša zameriavajú na štúdium mládeže v riziku fajčenia, užívania drog a alkoholu, ktoré môžu negatívne ovplyvniť ich zdravie. Mohli by však byť viac zamerané aj na správanie a zdravý životný štýl, keďže pozorované zlepšenie zdravia by mohlo byť vo vzťahu so správaním ochraňujúcim zdravie.

Kapitola 4 sa zaoberá socio-ekonomickými rozdielmi v zmenách subjektívneho zdravia v kohorte 15 ročných adolescentov sledovaných do 19. roku života. Posudzuje, či sa zmeny v subjektívnom zdraví líšili vzhľadom ku vzdelaniu respondentov, ich aktuálnemu pracovnému statusu a vzdelaniu a pracovnému statusu rodičov. Socio-ekonomické rozdiely v subjektívnom zdraví u mužov vo veku 15 rokov boli nevýrazné a zostali stabilné do 19. roku života. Tradičný socioekonomický gradient rozdielov v subjektívnom zdraví žien (čím vyššia socio-ekonomická pozícia, tým lepšie zdravie) sa od 15. do 19. roku života prehĺbil.

Kapitola 5 popisuje rozdiely v sociálno-ekonomických nerovnostiach v subjektívnom zdraví medzi kohortami slovenských adolescentov z rokov 1998 a 2006. Posudzuje výskyt zlého zdravotného stavu vo vzťahu k vzdelaniu rodičov. Zároveň bola indexom disimilarity meraná aj veľkosť sociálno-ekonomických rozdielov v zdravotnom

stave. Tradičný socio-ekonomický gradient bol zistený u mužov i žien v roku 1998 a aj v roku 2006. Index disimilarity od roku 1998 do 2006 klesol. Naše zistenia potvrdzujú efekt periódy na sociálno-ekonomické rozdiely v zdraví, pravdepodobne z dôvodu zmien v spoločenskom, kultúrnom, ekonomickom a fyzickom prostredí. Mohlo by to byť dôsledkom spoločenskej stabilizácie.

Kapitola 6 skúma zmeny v oblasti so zdravím súvisiaceho správania sa v kohorte adolescentov medzi 15. a 19. rokom života, a to vo všeobecnosti, ako i podľa sociálno-ekonomickej pozície. Skúma zmeny vo fajčení adolescentov, užívaní alkoholu, v skúsenostiach s marihuanou a v nedostatku fyzickej aktivity s ohľadom na ich súčasnú úroveň vzdelania, postavenie v zamestnaní, a najvyššiu úroveň vzdelania a pracovné postavenia ich rodičov. Bol popísaný nárast nezdravého správania sa počas dospievania. U mužov bol najzrejmejší socio-ekonomický gradient vo fajčení, a to ako vo veku 15, tak i 19 rokov. Zmeny v sociálno-ekonomických rozdieloch v oblasti so zdravím súvisiaceho správania boli viac viditeľné u žien. Hoci vo veku 15 rokov u nich neboli zistené žiadne sociálno-ekonomické rozdiely v oblasti so zdravím súvisiaceho správania, vo veku 19 rokov boli rozdiely zistené takmer vo všetkých sociálno-ekonomických ukazovateľoch. U mužov boli zistené iba tradičné socio-ekonomické gradienty v správaní (čím vyššia socio-ekonomická pozícia, tým menej rizikové správanie), zatiaľ čo u žien boli nájdené aj opačné socio-ekonomické gradienty.

Kapitola 7 sa zaoberá sociálnou oporou a jej úlohou v sociálno-ekonomických rozdieloch v subjektívnom zdraví u dospievajúcej mládeže. Skúmame, či je sociálna opora od otca, matky a priateľov mediátorom alebo moderátorom vzťahov medzi sociálno-ekonomickou pozíciou a subjektívnym zdravím adolescentov. Sociálna opora zo strany otca bola mediátorom vzťahu medzi majetkovými pomermi rodiny a subjektívnym zdravím rovnako u mužov a žien a mediátorm vzťahu medzi finančným zaťažením rodiny a subjektívneho zdravia, avšak iba u mužov. Nebol potvrdený moderujúci vplyv sociálnej opory na sociálno-ekonomické rozdiely v subjektívnom zdraví. Aj keď je často zdôrazňovaný význam sociálnej opory zo strany matky v stresových životných situáciách, otcovská angažovanosť má tiež potenciál mediovať sociálno-ekonomické rozdiely v zdraví. Otec a matka sa vzájomne dopĺňajú pri poskytovaní sociálnej opory svojim deťom. Aktívny prístup rodičov v období adolescencie má potenciál ovplyvniť subjektívne zdravie ich potomkov.

V poslednej kapitole sú diskutované hlavné zistenia vo všeobecnejšej rovine vložené do kontextu sociálno-ekonomických nerovností v zdraví. Diskutované sú zmeny zdravia a so zdravím súvisiaceho správania od 15. po 19. roku života. Je kladený dôraz na porovnanie rôznych kohort adolescentov v odlišných obdobiach na základe sociálno-ekonomických rozdielov v zdraví. Okrem toho, je diskutovaná aj úloha sociálnej opory v socio-ekonomických rozdieloch v zdraví počas adolescencie. Ďalej sú uvedené silné a slabé stránky štúdie. Taktiež sú formulované odporúčania pre ďalší výskum a prax. K určeniu faktorov, ktoré môžu vysvetľovať príčiny meniaceho sa fyzického a duševného zdravia sú odporúčané longitudinálne štúdie zahrňujúce aj detstvo a dospelosť. V odporúčaniach pre prax je okrem iného diskutovaný význam podpory zdravia u žien s nižším socio-ekonomickým statusom.

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About the author

Ferdinand Salonna was born on the 7th of April, 1977, in Košice, Slovak Republic. After finishing secondary school in Kosice, he studied at Pavol Jozef Šafárik University in Košice. In September 2001 he graduated in pedagogy, with a specialisation in biology-chemistry. His Master thesis was titled "Risks associated with prevention of drug dependence in the school routine". During his civil military service, he worked as a teacher at an elementary school in Košická Nová Ves, which was known for having a high percentage of pupils from socially impaired environments. This experience raised his interest in the topic of inequalities among children. During that time he started to work as a researcher at P.J. Safarik University and at the same time started his PhD studies at the University of Groningen, The Netherlands. He focused on inequalities in health and health-related behaviour among Slovak children and adolescents. In addition, he delivered lectures on the subjects 'Biology of Child and Adolescent Development', 'Basics of methodology of psychological and pedagogical research', 'Basics of statistics' and 'Drug prevention' while also supervising students' bachelor theses and providing consultations for master and PhD students.

He has been a participant in several international (e.g. SNIPE - Social Norms Intervention for the prevention of Polydrug use; SLiCE - Students Life Cohort study in Europe) as well as national (e.g. APVV–0032-11 Social determinants of health in school-aged children; APVV-20-038 205 Individual, interpersonal, social and societal factors of risky behaviour in adolescence and early adulthood) research projects. Furthermore, he was a member of academic senate at the Faculty of Arts, Safarik University in Košice (2007-2012), and secretary of the Department of Educational and Health Psychology at the same university (2004–2012). He is active field of health promotion and drug prevention among adolescents and young adults, where he has participated in dozens of short-term projects mainly funded by the Slovak Antidrug Fund, the Slovak government office and the EU (Youth in action). He is a member of European Public Health Association (EUPHA) and the Slovak Public Health Association (SAVEZ).

At present he works as a researcher at the Institute of Active Living, Faculty of Physical Culture, Palacky University in Olomouc, and he also has an appointment at the Department of Engineering Education, Technical University in Košice, with some teaching duties.

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